TRC-68-17

AD 673202

OPERATION CENIZA-ARENA:

THE RETENTION OF FALLOUT PARTICLES FROM VOLCAN IRAZU (COSTA RICA) BY PLANTS AND PEOPLE

PART THREE

AUG 1 6 1968

STANFORD
RESEARCH
INSTITUTE

MENLO PARK
CALIFORNIA

This document has been approved for public release and sale; its distribution is unlimited

OPERATION CENIZA-ARENA:

THE RETENTION OF FALLOUT PARTICLES FROM VOLCAN IRAZU (COSTA RICA) BY PLANTS AND PEOPLE

PART THREE

SRI Project
No. MU-4890

December 1967

Prepared by:
Carl F. Miller

Contract No. OCD-PS-64-127
OCD Work Unit No. 3118A

STANFORD
RESEARCH
INSTITUTE

MENLO PARK
CALIFORNIA

Prepared for:

OFFICE OF CIVIL DEFENSE
DEPARTMENT OF THE ARMY
OFFICE OF THE SECRETARY OF THE ARMY
WASHINGTON, D.C. 20310

Through:

Technical Management Office
U.S.N.R.D.L..
San Francisco, California 94135

OCD Review Notice

This report has been reviewed by the Office of Civil Defense and approved for publication. Approval does not signify that the contents necessarily reflect the views and policies of the Office of Civil Defense.

Best Available Copy

CONTENTS

ILLUSTRATIONS

Preceding Page Blank

ILLUSTRATIONS

TABLES

TABLES

INTRODUCTION

This report presents a summary and correlation analysis of the foliar contamination and related data that were obtained in Costa Rica during field work on Operation Ceniza-Arena. The observed data are reported in Part One and Part Two of the report; the treatment of the data given here (Part Three) deals almost entirely with the results presented in Part Two.

During the first phase of the field work, described in Part One, foliar contamination data were obtained only for single leaves, small groups of leaves, and other parts of single plants. Except for native shrubs, grasses, flowers, and trees, the plants used in the experiments consisted of specimens obtained from local farmers, potted, and moved to the collection stations.

In the second phase of the field work, described in Part Two, foliar contamination data were obtained for whole plants and groups of whole plants as well as for leaves (singly and in groups) and other plant parts. The plant specimens, consisting of 13 different types of vegetables (including corn) and four cereal grains, were field-grown in two land plots. In addition, leaf contamination data were obtained for six different kinds of trees.

The major purpose of the data analysis was to develop mathematical models of the foliar contamination process for use in evaluating the consequences of nuclear war, particularly with respect to the degree and extent of radiation damage to food crops and forests and to the contamination of foodstuffs. In addition, the models may be used to provide information on the degree to which radiation fields from volume-distributed radiation sources resulting from foliar retention could differ from those from simple planar sources.

BACKGROUND

The basic definitions and parameters and equations used in the tabulation of the foliar contamination data and for describing relationships among the parameters are described in Part One. For convenience, the definitions of several of the terms are repeated below and expanded where needed to clarify their meaning and use in the analysis of the data. In addition, a set of generalized modeling functions is discussed for application to the foliar contamination of whole plant specimens grown under field conditions. The previously described relationships, in contrast, were intended for application to single leaf collectors or to an ensemble of leaves (or other aboveground pl nt parts).

The foliar contamination factor for a plant or plant part is designated a_L and is defined, in terms of experimentally measured quantities, by

$$a_L = C_p^o/\Delta m \tag{1}$$

where C_p^o is the effective or average concentration of the particles on the foliage (in gm of particles per gm of dry foliage) and Δm is the weight of the particles deposited per unit of open ground area (in gm of particles per sq ft of soil area). The fraction of the ground-deposited particles that is retained by the foliage in a field of similar plants is given by

$$F_L = a_L w_L \tag{2}$$

where w_L is the average surface density of the foliage (in gm of dry foliage per sq ft of soil area). It should be noted that F_L refers to the fraction of the ground deposit; it is not the true fraction of the particles retained by the foliage from the particle flux in the air passing over the field of plants. For any given area of the field that is large relative to the area of spread of a single plant, the true weight fraction of the particles retained by the foliage is given by

Preceding Page Blank

$$F_p^o = \frac{M_p^o}{M_p^o + M_g^o} \tag{3}$$

where M_p^o is the weight of the particles deposited on all the foliage and M_g^o is the weight of the particles deposited on the ground underneath and between the plants. If the plants collect more particles than would be deposited on the same ground area without plants, the value of F_L would be greater than one; the value of F_p^o, however, cannot exceed one. In general, the value of F_p^o cannot be computed from the foliar contamination data; however, for large particles that are deposited under low wind speed conditions, the value of F_p^o is approximately equal to F_L.

For a section of a field of width x and length y, the weight of particles deposited on the ground (assumed to be level) in the absence of plants (open field) is given by

$$M_g = xym_o \sin \varphi \tag{4}$$

where m_o is the particle flux for a given deposit period or shower (in gm per sq ft) and φ is the average angle between the horizontal and the average fall vector of the particles in the direction of the wind. M_g is equal to $xy\Delta m$. If the area defined by xy contains n_p plants, each having an average dried weight of m_p, the average surface density of the foliage over the area is given by

$$w_L = n_p m_p / xy \tag{5}$$

The weight of the particles, M_p, retained on the foliage of the plants in the area defined by xy will depend mainly on the shape and size of the plants, their surface density, and the volume density of the foliage. Generalized equation forms for M_p and F_L are derived below for some simple geometric plant shapes.

Case 1: Plants with Flat Elliptically Shaped Leaves

Let φ be the angle between the horizontal and the particle fall vector, θ the angle between the horizontal and the plane of the leaf in a plane parallel to the direction of the wind, γ the angle between the plane of the leaf and the wind direction in a plane parallel to the

horizontal, η the apparent impaction and retention or screening coefficient, a the half-length of the leaf (major axis), b the half-width of the leaf (minor axis), h the thickness of the leaf, ρ the density of the leaf, n_ℓ the number of leaves per plant, and n_p the number of plants in the area defined by xy.

If η accounts statistically for the shielding of one leaf by another, the weight of particles collected by a single leaf (no differentiation is made as to which side of the leaf collects the particles) is represented by

$$M_\ell = \pi\eta abm_o \sin(\theta - \varphi)\sin\gamma,\ \theta \geq \varphi,\ \gamma = 0 \text{ to } 90° \qquad (6)^*$$

or

$$M_\ell = \pi\eta abm_o \sin(\varphi - \theta)\sin\gamma,\ \theta \leq \varphi,\ \gamma = 0 \text{ to } 90° \qquad (7)^*$$

If the values of γ are randomly distributed among the field of plants for which the average value of sin γ is $2/\pi$ and if the leaves hang at a characteristic angle, θ, the total weight collected by the $n_\ell n_p$ leaves is represented by

$$M_p = 2\eta abn_\ell n_p m_o \sin(\theta - \varphi),\ \theta \geq \varphi \qquad (8)$$

or

$$M_p = 2\eta abn_\ell n_p m_o \sin(\varphi - \theta),\ \theta \leq \varphi \qquad (9)$$

The value of w_L for all the leaves of the plants in the area xy is

$$w_L = \pi\rho n_\ell n_p abh/xy \qquad (10)$$

---

* If θ is defined only as the angle between the horizontal and the plane of the leaf (not necessarily in the plane parallel to the direction of the wind), the angular functions in Equations 6 and 7 would be $\sin\theta\cos\varphi\sin\gamma - \sin\varphi\cos\theta$ instead of $\sin(\theta - \varphi)\sin\gamma$ or $\sin(\varphi - \theta)\sin\gamma$.

Since F_L is equal to the ratio M_p/M_g, combination of Equations 4, 8 or 9, and 10 gives, for F_L

$$F_L = \frac{2\eta w_L \sin(\theta - \varphi)}{\pi\rho h \sin\varphi}, \quad \theta \geq \varphi \tag{11}$$

or

$$F_L = \frac{2\eta w_L \sin(\varphi - \theta)}{\pi\rho h \sin\varphi}, \quad \theta \leq \varphi \tag{12}$$

and, since F_L is equal to $a_L w_L$, Equations 11 and 12, on expansion of the $\sin(\theta - \varphi)$ and $\sin(\varphi - \theta)$ terms, become

$$a_L = (2\eta/\pi\rho h)(\alpha \sin\theta - \cos\theta), \quad \theta \geq \varphi \tag{13}$$

and

$$a_L = (2\eta/\pi\rho h)(\cos\theta - \alpha \sin\theta), \quad \theta \leq \varphi \tag{14}$$

in which α is equal to $\cot\varphi$.

Thus, for plants with a few flat elliptically shaped leaves (other shapes would give the same results), a_L should be constant and independent of w_L. Equation 13, for θ values between φ and 90°, would represent deposits on the bottom side of the leaf and, for θ values between 90° and 180°, deposits on the top side of the leaf. Equation 14, for θ values between zero and φ, represents deposits on the top side of a leaf. Since the above equations represent the dependence of a_L on θ and φ only for plant spacings sufficiently large so that every leaf is exposed to depositing particles, their application does not extend to geometries where one leaf is shielded by another. For a given value of θ in Equation 13 and a given plant spacing arrangement, a limiting value of φ (or α) exists at which the leaf on one plant begins to intercept particles that would otherwise have impacted on the leaf of an adjacent plant. If δ is designated as the angle between the row of plants in the x direction and the direction of the wind and if the plant spacings are designated as x_p in the rows and the spacing between rows is designated as y_p, the distance between nearest plants in the direction of the wind would be given by

$$d = \sqrt{(ix_p)^2 + (jy_p)^2} \tag{15}$$

$$d = ix_p/\cos\ \delta \tag{16}$$

or

$$d = jy_p/\sin\ \delta \tag{17}$$

where i and j are integers. For most spacings and plant or leaf sizes, only paired values of 0 and 1 or 1 and 1 for i and j are of interest. The limiting values of α for the above conditions are

$$\alpha \le \frac{d}{2a\ \sin\ \theta} + \cot\ \theta,\ \theta = \varphi \text{ to } 90° \tag{18}$$

and

$$\alpha \le \frac{d}{2a\ \sin\ \theta} - \cot\ \theta,\ \theta = 90° \text{ to } 180° \tag{19}$$

for Equation 13 and

$$\alpha \ge \cot\ \theta - \frac{d}{2a\ \sin\ \theta} \tag{20}$$

for Equation 14. For α values beyond these limits, a_L would be less than that given by the two equations because some portion of the leaves would not be exposed to depositing particles whereas the weight of the leaves remains constant. At the limiting values of α, Equations 13 and 14 reduce to

$$a_L = \frac{\eta d}{\eta \rho a h},\ \theta = 0 \text{ to } 90° \tag{21}$$

and Equation 14 to

$$a_L = \frac{\eta(d - 4a \cos \theta)}{\pi \rho a h}, \ \theta = 90^\circ \text{ to } 180^\circ \tag{22}$$

If it is assumed that F_L is approximately equal to F_p^o, the fraction of the particles retained on the foliage, the second limiting condition for the value of a_L is that

$$a_L \leq 1/w_L \tag{23}$$

For horizontal flat leaves, Equation 11 reduces to

$$a_L = \frac{\eta}{\rho h} \tag{24}$$

and, for vertical flat leaves, Equation 11 reduces to

$$a_L = \frac{\eta \alpha}{\rho h} \tag{25}$$

One of the plants whose leaf geometry is represented by the horizontal flat leaves, generally with full exposure to depositing particles, is the small bean plant with its first pair of leaves.

Case 2: Plants with Ribbon-Shaped Leaves

Let ℓ be the length, a the width, and h the thickness of the ribbon-shaped leaf (or grass blade) and assume that the ribbon maintains a circular shape starting at a vertical angle of 90° at its base and ending at a horizontal angle of 180° at its tip and that the width of ribbon stays perpendicular to the direction of the wind. With other parameters as defined for Case 1 and noting that the ribbon, for a given value of φ, intercepts particles at all angles of θ from 90° to 180°, the effective projected area also varies so that M_g is estimated from

$$M_{\ell} = \eta n_{\ell} a \ell m_o \int_{90}^{180} \sin(\theta - \varphi) d\theta \quad (26)$$

which, when integrated over the indicated angles, results in

$$M_{\ell} = \eta n_{\ell} a \ell m_o (\cos \varphi + \sin \varphi) \quad (27)$$

where n_{ℓ} is the number of blades in the area xy. The value of w_L is given by

$$w_L = \rho n_{\ell} a \ell h / xy \quad (28)$$

and F_L, on combination of Equations 4, 27, and 28, is given by

$$F_L = \frac{\eta w_L}{\rho h} (\alpha + 1) \quad (29)$$

and

$$a_L = \frac{\eta}{\rho h} (\alpha + 1) \quad (30)$$

If the blades are short and maintain a rather rigid vertical position, Equation 26 would reduce to

$$a_L = \frac{\eta \alpha}{\rho h} \quad (31)$$

which has the same dependence on α as that of the vertical flat leaves.

Case 3: Cylindrically Shaped Plants, Tube-Shaped Foliage and Stems

Let a be the radius of the cylinder, tube, or stem and z its height and assume the top of the cylindrically shaped plants to be flat. For this geometric form of plants with leaves (e.g., vines on a pole), the angular orientation of the leaves is neglected, and η represents a

screening coefficient more than it does an impaction coefficient. The dependence of M_p on φ and the plant shape parameters is represented by

$$M_p = \eta n_p m_o(\pi a^2 \sin \varphi + 2az \cos \varphi) \tag{32}$$

and

$$w_L = n_p \rho \pi a^2 z/xy \tag{33}$$

To eliminate both a and z from Equations 32 and 33 for comparison of the retention among plants of different sizes and ages, a relation between z and a is needed, and, since none is directly available, it is assumed alternately that x is proportional to a, a^2, and a^3 for broad, medium, and thin plant forms, respectively. For z equal to $\kappa_0 a$, the equation for F_L is

$$F_L = \eta\left(\frac{n_p}{xy}\right)^{1/3}\left(\frac{w_L}{\rho\pi\kappa_0}\right)^{2/3}(\pi + 2\kappa_0\alpha) \tag{34}$$

where ρ is the volume density of the foliage. In Equation 34, F_L is proportional to $w_L^{2/3}$ and to the one-third power of the number of plants per unit area. For z equal to $\kappa_1 a^2$, the equation for F_L is

$$F_L = \eta\left[\left(\frac{n_p}{xy}\right)^{1/2}\left(\frac{\pi w_L}{\rho\kappa_1}\right)^{1/2} + 2\kappa_1^{1/4}\left(\frac{n_p}{xy}\right)^{1/4}\left(\frac{w_L}{\rho\pi}\right)^{3/4}\alpha\right] \tag{35}$$

and, if the amount of particles retained along the side of the plant is large relative to that collected at the top (as would be the case for the larger values of α), Equation 35 becomes

$$F_L \simeq 2\eta\kappa_1^{1/4}\left(\frac{n_p}{xy}\right)^{1/4}\left(\frac{w_L}{\rho\pi}\right)^{3/4}\alpha \tag{36}$$

and F_L is proportional to $w_L^{3/4}$ and to the one-fourth power of the planting density. For z equal to $\kappa_2 a^3$, the equation for F_L is

$$F_L = \eta\left[\pi\left(\frac{n_p}{xy}\right)^{3/5}\left(\frac{w_L}{\rho\pi\kappa_2}\right)^{2/5} + 2\kappa_2^{1/5}\left(\frac{n_p}{xy}\right)^{1/5}\left(\frac{w_L}{\rho\pi}\right)^{4/5}\alpha\right] \tag{37}$$

and, since the amount of particles retained by the top of these tall thin plants is expected to be small relative to that collected along its sides, Equation 37 reduces to

$$F_L = 2\eta\kappa_2^{1/5}\left(\frac{n_p}{xy}\right)^{1/5}\left(\frac{w_L}{\rho\pi}\right)^{4/5}\alpha \tag{38}$$

and F_L is proportional to $w_L^{4/5}$ and to the one-fifth power of the planting density.

The limiting values of α for Equations 34 through 38, depending on the planting density and plant size, are

$$\alpha \le (d - 2a)/\kappa_0 a \tag{39}$$

for Equation 34 with z equal to $\kappa_0 a$,

$$\alpha \le (d - 2a)/\kappa_1 a^2 \tag{40}$$

for Equations 35 and 36 with z equal to $\kappa_1 a^2$, and

$$\alpha \le (d - 2a)/\kappa_2 a^3 \tag{41}$$

for Equations 37 and 38 with z equal to $\kappa_2 a^3$. In these equations, the distance between the neighboring plants, d, is the same as that defined by Equations 15 through 17. For α values larger than the limiting values given by Equations 39 through 41, F_L ceases to depend on α and is given by

$$F_L = \pi\left(\frac{n_p}{xy}\right)\left[2d\left(\frac{w_L xy}{n_p \rho\pi\kappa_0}\right)^{1/3} + (\pi - 2)\left(\frac{w_L xy}{n_p \rho\pi\kappa_0}\right)^{2/3}\right] \tag{42}$$

for the condition that z equals $\kappa_0 a$,

$$F_L = \pi\left(\frac{n_p}{xy}\right)\left[2d\left(\frac{w_L xy}{n_p \rho\pi\kappa_0}\right)^{1/4} + (\pi - 2)\left(\frac{w_L xy}{n_p \rho\pi\kappa_0}\right)^{1/2}\right] \tag{43}$$

for the condition that z equals $\kappa_1 a^2$, and

$$F_L = \pi\left(\frac{n_p}{xy}\right)\left[2d\left(\frac{w_L xy}{n_p \rho\pi\kappa_0}\right)^{1/5} + (\pi - 2)\left(\frac{w_L xy}{n_p \rho\pi\kappa_0}\right)^{2/5}\right] \tag{44}$$

for the condition that z equals $\kappa_2 a^3$. The above three equations are all derived from

$$F_L = \pi\left(\frac{n_p}{xy}\right)\left[2ad + (\pi - 2)a^2\right] \tag{45}$$

If the plant tops are small and collect only a negligible fraction of the total amount of particles retained by the plant, the constant π would not appear in Equations 42 through 45.

Case 4: Cone-Shaped Plants

Let a be the radius of the base, z the height, and other parameters as previously defined. The projected areas for this geometry result in the following general equations for F_L:

$$F_L = \pi\left(\frac{n_p}{xy}\right)a^2\left[\frac{\pi}{180}\sin^{-1}\left(\frac{2az\alpha}{a^2 + z^2\alpha^2}\right) + \frac{\pi}{2} - \frac{\alpha z(a^2 - z^2\alpha^2)}{a(a^2 + z^2\alpha^2)}\right] \tag{46}$$

and

$$w_L = (\pi/3)\rho a^2 h/xy \tag{47}$$

where ρ is the volume density of the foliage. (For trees, the branches are usually neglected, and ρ represents only the volume density of the leaves.) For z equal to $\varkappa_0 a$, Equations 46 and 47 reduce to

$$F_L = \pi\left(\frac{n_p}{xy}\right)a^2\left[\pi\left(\frac{\delta_0}{180} + \frac{1}{2}\right) - \varkappa_0\alpha \cos \delta_0\right] \tag{48}$$

and

$$a^2 = \left(\frac{3xyw_L}{n_p \rho\pi\varkappa_0}\right)^{2/3} \tag{49}$$

in which

$$\cos \delta_0 = \frac{1 - \varkappa_0^2\alpha^2}{1 + \varkappa_0^2\alpha^2} \tag{50}$$

For z equal to $\varkappa_1 a^2$, Equations 46 and 47 reduce to

$$F_L = \pi\left(\frac{n_p}{xy}\right)a^2\left[\pi\left(\frac{\delta_0}{180} + \frac{1}{2}\right) - \varkappa_1 a\alpha \cos \delta_1\right] \tag{51}$$

and

$$a = \left(\frac{3xyw_L}{n_p \rho\pi\varkappa_1}\right)^{1/4} \tag{52}$$

in which

$$\cos \delta_1 = \frac{1 - \kappa_1^2 a^2 \alpha^2}{1 + \kappa_1^2 a^2 \alpha^2} \quad , \tag{53}$$

For α values less than the ratio a/z, the value of F_L becomes independent of α and is represented by

$$F_L \quad \Pi\left(\frac{n_p}{xy}\right)\pi a^2 \tag{54}$$

or

$$F_L = \Pi\left(\frac{n_p \pi}{xy}\right)^{1/3} \left(\frac{3w_L}{\rho\kappa_0}\right)^{2/3} \tag{55}$$

for z equal to $\kappa_0 a$ and

$$F_L = \Pi\left(\frac{3\pi n_p w_L}{xy\rho\kappa_1}\right)^{1/2} \tag{56}$$

for z equal to $\kappa_1 a^2$. The upper limits of α for application of Equations 48 and 51 are, respectively

$$\alpha \leq (d - a)/\kappa_0 a \tag{57}$$

and

$$\alpha \leq (d - a)/\kappa_1 a^2 \tag{58}$$

Case 5: Hemispherically Shaped Plants

Let a be the radius of the plant (at ground level) and other parameters as previously defined. The general equation for F_L for this geometry is given by

$$F_L = \frac{\pi m_p a^2 (1 + \sin \varphi)}{2xy \sin \varphi} \tag{59}$$

and the surface density is

$$w_L = (2/3)\pi m_p \rho a^3/xy \tag{60}$$

Substituting the value of a from Equation 60 into Equation 59 gives

$$F_L = \pi \left(\frac{\pi m_p}{xy}\right)^{1/3} \left(\frac{3w_L}{2\rho}\right)^{2/3} \frac{(1 + \sin \varphi)}{2 \sin \varphi} \tag{61}$$

The limiting value of α for Equation 61 is

$$\alpha \leq (1/a) \sqrt{d(d - 2a)} \tag{62}$$

at which point F_L becomes

$$F_L = \frac{\pi d}{2} \left(\frac{\pi m_p}{xy}\right)^{2/3} \left(\frac{3w_L}{2\rho}\right)^{1/3} \tag{63}$$

For α values less than that given by Equation 62, the precise solutions of the effect of shadowing of one plant by another become far too complex for simplified models even when two similar plants are lined up in the direction of the wind. To approximate the shadowing effect, the shadow of the upwind plant is assumed to have a parabolic shape on the plant(s) in the downwind direction. With this assumption, the value of F_L is represented by

$$F_L = \frac{\pi m_p a(a - d \sin \varphi)}{2xy \sin \varphi}, \quad \alpha \geq (1/a) \sqrt{d(d - 2a)} \tag{64}$$

or with substitution of Equation 60

$$F_L = \frac{\pi}{2}\left[\left(\frac{m_p}{xy}\right)^{1/3}\left(\frac{3w_L}{2\rho}\right)^{2/3}\left(\frac{1}{\sin \varphi}\right) - \left(\frac{m_p}{xy}\right)^{2/3}\left(\frac{3w_L}{2\rho}\right)^{1/3} d\right] \tag{65}$$

Thus, for the hemispherically shaped plants, F_L would appear to depend on the angle of fall of the depositing particles down to very small values of φ.

Case 6: Spherically or Oblate Spheroidally Shaped Plants

Let a be the minor axis of rotation of an elliptical spheroid in the horizontal plane, b the major axis in the vertical direction, and z_0 the midheight of the spheroid. If a is equal to b, the plant shape is spherical. The height at the top of the plant is $z_0 + b$, and the height at the bottom of the foliar canopy is $z_0 - b$. The stem or trunk of the plant is not considered. The general equation for F_L for the elliptical spheroid is

$$F_L = \left(\frac{\pi m_p a}{xy}\right)\sqrt{\frac{(1 + \alpha^2)(a^4 + \alpha^2 b^4)}{(a^2 + \alpha^2 b^2)}} \tag{66}$$

noting that $\sin \varphi$ is equal to $1/\sqrt{1 + \alpha^2}$. The planting density is

$$w_L = (4/3)\pi m_p \rho a^2 b/xy \tag{67}$$

where ρ is the average volume density of the leaves (stems and trunks are not included). If b is equal to $\kappa_0 a$, combination of Equations 66 and 67 give

$$F_L = \pi\left(\frac{\pi n_p}{xy}\right)^{1/3} \left(\frac{3w_L}{4\rho\kappa_0}\right)^{2/3} \sqrt{\frac{(1 + \alpha^2)(1 + \alpha^2\kappa_0^4)}{(1 + \alpha^2\kappa_0^2)}} \tag{68}$$

for the elliptical spheroid shape of plant. The equation for F_L for a spherically shaped plant is obtained by setting κ_0 equal to one and is given by

$$F_L = \pi\left(\frac{\pi n_p}{xy}\right)^{1/3} \left(\frac{3w_L}{4\rho\kappa_0}\right)^{2/3} \left(\frac{1}{\sin\varphi}\right) \tag{69}$$

The limiting values of α for application of Equations 68 and 69 are, respectively

$$\alpha \le (1/\kappa_0 a) \sqrt{\frac{(d^2 - 2a^2)}{2}} \tag{70}$$

and

$$\alpha \le (1/a) \sqrt{\frac{(d^2 - 2a^2)}{2}} \tag{71}$$

For α values greater than those of Equations 70 and 71, the shadowing effect of one plant on another takes place. The approximate form of the equation for F_L for plants lined up in the direction of the wind (maximum effect) is as follows, assuming spherically shaped canopies

$$F_L = \frac{\pi n_p a^2}{xy \sin\varphi} \left[\frac{\pi(180 - \delta)}{180} + \sin\delta\right] \tag{72}$$

in which

$$\sin\delta = 2s\sqrt{1 - s^2} \tag{73}$$

and

$$s = \frac{1}{2}\left[1 - \frac{(\alpha a - d)}{\alpha a \sqrt{1 + \alpha^2}}\right] \tag{74}$$

or

$$s = \frac{1}{2}\left[1 - \left(1 - \frac{d \tan \varphi}{a}\right)\sin \varphi\right] \tag{75}$$

With substitution of Equation 67 and with b equal to a, Equation 72 becomes

$$F_L = \eta\left(\frac{n_p}{xy}\right)\left(\frac{3w_L}{4\pi\rho}\right)^{2/3}\left(\frac{1}{\sin \varphi}\right)\left[\frac{\pi(180 - \delta)}{180} + \sin \delta\right] \tag{76}$$

Thus, as for the hemispherically shaped plants, F_L depends on the angle of particle fall down to very low angles. It is assumed that this case would apply more closely to tree canopies than to any of the other plant geometry cases discussed above.

In the derivation of the equations for F_L in each case, the implied assumption is that η is independent of the angle of fall of the particles and, further, that η is not defined as an impaction coefficient but as a parameter whose value depends on the impaction efficiency, retention efficiency, and relative amount of shielding of the leaves not directly exposed to the impacting particles. It is expected, therefore, that the value of η should depend on the wind speed and that the degree of dependence should vary with the general degree of rigidity of the plant leaves. The force of the wind would tend to move leaves to a more horizontal position as the wind increases. However, since the wind speed is never constant, the leaves (as well as the whole plant) are constantly in motion as long as the wind speed is great enough to overcome the inertia of the foliar ensemble. As a result of this movement, which increases as the wind speed increases, the value of η should decrease as the wind speed increases.

DATA SUMMARY

Gross Deposits and Meteorological Parameters

The gross deposit of ceniza-arena, the average or effective wind speed during deposition period, and the sample type for each set of foliar samples are summarized in Table 1. The tabulated wind speeds are corrected values and were computed through use of the equations and data given in Part Two. The time of weathering, average (corrected) wind speed during the weathering period, the integrated wind speed, and amount of rainfall for each set of weathering foliar samples are summarized in Table 2. The data included in Tables 1 and 2 consist only of those taken during the second field phase of Operation Ceniza-Arena. Similar information for the first phase is included in several of the following tables; they are not listed separately because they are less complete.

Foliar Contamination and Weathering Data

The foliar contamination data for primary samples taken under dry deposition conditions (usually for deposits occurring after 0800 and before 1700 when the relative humidity was less than 90 percent) for the vegetables, cereal grains, flowers, vines, and relatively small shrubs are summarized in Table 3. The tabulated data include the plant age in days after seeding, the corrected average wind speed, the plant weight, the foliar surface density, the calculated fractional weight of particles retained by the foliage relative to the deposit on an open ground area, and the background concentration of the particles (i.e., the relative weight of the particles not removed by a high pressure water spray). In some cases, wind speed for the samples taken during the first phase of the field work was computed from the average daily wind speeds as given in Part One. The sample notations used in Part Two are: -1 for a leaf or group of leaves; -2 for a fruit or grain head; -2* for a flower; -3 for a stem or branch; -4 for a corn tassel; and a combination such as -1,3 for leaves and stems together.

The foliar contamination data for the primary samples of the vegetables, cereal grains, flowers, vines, and small shrubs that were taken under damp conditions (usually resulting from deposits occurring after 1700 and before 0800 or shortly after a rain at other times of the day)

are summarized in Table 4. Similar data for secondary samples of these plants are summarized in Table 5. In this table, the deposit conditions are also given, and, for those cases where more than one particle shower took place within the sampling period, notations such as dry, damp, or semidamp are used to indicate the result of daytime and nighttime deposits or morning or evening deposits. As in Parts One and Two, the samples obtained shortly after a single or double shower of particles before significant weathering effects could take place are designated as primary samples. The samples taken after exposure to several showers or prolonged exposures where significant weathering effects might have occurred are designated as secondary samples.

The foliar contamination data for the leaves and twigs of large shrubs and trees from the primary samples taken under dry deposit conditions, the primary samples taken under damp conditions, and the secondary samples are summarized in Tables 6, 7, and 8, respectively.

The foliar contamination weathering data are summarized in Tables 9 and 10. The data include the age and weight of the plants; the integrated wind speed during wind weathering periods, τ (equal to $\bar{v}_w t$, where t is the time of weathering and $\bar{v}_w$ is the average wind speed); the fraction, Ψ_w, of the original deposit remaining at t due to wind weathering; the amount of rainfall before sampling, R; the fraction, Ψ_{wr}, of the original deposit remaining after wind weathering and rain (the latter sets of samples were usually taken after rainfall before another particle shower took place); and the initial deposit conditions of the primary or secondary samples to which the weathered samples are referred and taken at t equal to zero.*

As discussed in Part One, the weathering effects are reflected in changes in the particle retention coefficient with time after the initial deposit (and during deposit for a long period of continuous deposition). The mathematical representation of the results is

$$\epsilon(\alpha, t) = \frac{\epsilon_o(\alpha)\left[f_R \Psi_w + f_{NR}\right]}{G} \tag{77}$$

for wind weathering and

---

* Note the change in notation from φ_w and φ_{wr} as used in Part One for the two weathering parameters.

$$\epsilon(\alpha,t) = \frac{\epsilon_o(\alpha)\left[f_R\Psi_{wr} + f_{NR}\right]}{G} \tag{78}$$

for combined wind and rain weathering; $\epsilon_o(\alpha)$ is the initial retention coefficient, f_R is the fraction of the deposit that is removed by wind or wind and rain, f_{NR} is the fraction that is not removed by wind or wind and rain, and G is a fractional plant growth factor. As a first approximation, rain should remove all the particles previously removed by the wind if the period of wind weathering before rain is not more than several days' duration. The derived function for the dependence of Ψ_w on the wind speed and time of weathering is

$$\Psi_w = e^{-k_w\tau} \tag{79}$$

where k_w is a constant for a given set of initial deposit conditions. The fraction of particles not removed by wind or rain is given by

$$f_{NR} = C^o_{PNR}/(a_L\Delta m) \tag{80}$$

in which C^o_{PNR} of Equation 80 should be closely approximated by the background loadings of particles remaining on the foliage after water washing with the high pressure sprayer. The values of Ψ_w and Ψ_{wr} are calculated on the basis of relative particle concentrations on the foliage from

$$\Psi_{wr} = \frac{C^o_p(\text{weathered})}{C^o_p(\text{initial})} \tag{81}$$

or

$$\Psi_{wr} = \frac{a_L(\text{weathered})}{a_L(\text{initial})} \tag{82}$$

since C^o_p is equal to $a_L\Delta m$. Application of Equation 82 permitted the estimations of Ψ_w and Ψ_{wr} when small additional amounts of ceniza-arena

were deposited during the weathering period. This application assumes a degree of retention of the additional particles that is equal to that of the initial deposit; that is, the value of a_L(initial) remains constant over the sampling sequence.

The weathering parameter may be alternately defined in terms of ratios of the F_L values, represented by

$$\Psi_{wr} = \frac{F_L(\text{weathered})}{F_L(\text{initial})} \tag{83}$$

to infer a fractional decrease in the amount of particles initially retained by a field of plants. The values of Ψ_{wr} from Equation 83 are the same as those from Equations 81 and 82 for a given value of w_L (since $F_L = a_L w_L$). However, experimentally, the values could differ due to differences in w_L at the two sampling locations. Local variations in w_L occur due to local differences in planting density and in plant sizes in any field of plants.

The values of τ in Tables 9 and 10 for the wind weathering samples taken during the first phase of the field work were computed from the averaged hourly wind speeds from all sets of measurements at each sampling station since the anemometers were not left in place when the stations were not manned and when the weathering took place. This procedure is accepted only because of the general consistency in the diurnal variation of the wind speeds over the sampling period.

Plant and Plant Part Weight, Age, and Projected Area Data

The data on the plant and plant part dry weights, ages, and planting density, n/xy (number of plants per sq ft), are summarized in Table 11. The data are averaged for each sampling period or portion thereof (usually a 7- to 10-day period). The plant age is given in days since planting. The average relative deviation, σ, in the plant or plant part dry weights is tabulated for each set to indicate the general relative spread in the data. In most sets where the number of sampled plants was fairly large (25 or more), the average relative deviation was between 10 and 25 percent. For the grain samples, the ratio of the weights of the seed heads to those of the whole stalks is given for three of the four cereal grains. Data on the rye were not included because this grain failed to set in the humid cool climate of Costa Rica. Examples of the frequency distributions of the plant or

plant part dry weights are shown in Figure 1 for a few selected sample sets consisting of a relatively large number of plants. Each point shown in the figure is an average weight of several plants as a single sample.

The average weights of the leaves and needles of the sampled trees are given in Table 12. The frequency or number distribution of the dry weights of the grapefruit tree leaves is shown in Figure 2. This distribution shows the relatively high abundance of the smaller leaves; the value of $m_p(50)$ for all leaves is 0.27 gm per leaf whereas the average weight is 0.33 gm per leaf. In most sample sets, the sampling was probably biased in the selection of the larger healthier plants; thus the cutoff in the distribution at the largest weight is probably accurate in both Figures 1 and 2 whereas the low weight cutoff is well represented only for the grapefruit leaves in Figure 2 and the barley heads in Figure 1. (The sampling of all the grains was carried out with less sampling bias.)

The data from the measurements on the projected areas of the leaves and other plant parts are summarized in Table 13 in terms of a tabulation of results from frequency distribution curve analyses; the projected areas at the accumulated percentages of 10, 50, and 90 are given as are the smallest and largest measured areas of each set of specimens. Examples of the frequency distribution data are shown by the plots in Figures 3 and 4 for the leaves from bean, cabbage, beet, potato, corn, and radish plants. The combined data for all sets of leaf samples from the avocado, camphor, grapefruit, and laurel trees are plotted in Figure 5. For most plants, the range in projected area from smallest to largest leaf is in excess of a factor of five. The largest range in areas is that shown for the cabbage where the largest area is more than 7,000 times larger than the smallest (the latter coming from the center of the forming head).

The projected area data were obtained to provide information for evaluating the $S_L(\alpha_p)$ parameter of Equation 3 as given in both Parts One and Two which, in turn, could be used to evaluate the impaction and retention coefficients for single leaves and other plant parts. Then, as illustrated in Part One, the estimation of the contamination factor for various leaf ensembles would be possible. However, because such detail of computation for large scale application of the information to nuclear war damage assessments would be infeasible, the analytical approach described in the previous section was evolved. Thus, although the projected area data are not utilized as originally planned, they are included for possible future application in such analyses.

Table 1

GROSS DEPOSIT, AVERAGE WIND SPEED DURING DEPOSITION PERIOD, AND SAMPLE TYPE FOR THE FOLIAR SAMPLE SETS

Sample Numbers	Δm (gm/sq ft)	$\bar{v}_w$ (mi/hr)	Sample Type
14012-14019	2.100	8.6	P, dry
14029-14033	39.55	8.5	S, semidamp
14039-14043	6.42	6.3	P, dry
14052-14054	6.60	6.4	SR
14067-14076	6.095	10.4	P, dry
14079-14080	12.35	10.4	SR
14081-14088	36.82	7.3	P, damp
14091-95,-97,-99,-101,-103	18.59	6.2	P, dry
14096,-98,-100,-102,-104	55.41	7.0	2P, damp
14120-14127	1.249	2.6	P, dry
14128-14137	12.62	3.0	P, damp
14139-14146	21.43	4.2	SW
14147-14156	23.49	4.8	SW
14158-14165	27.63	5.1	SWR
14177-14189	16.26	4.0	S, SW, SWR
14194-14197	4.70	3.5	P, damp
14198-14203	1.41	8.9	P, dry
14204-14215	8.35	5.5	S, damp
14227-14229	8.45	5.5	SW
14231-14237	1.25	8.8	P, dry
14239-14241	9.08	8.6	P, dry
14242-14244	10.32	8.7	P, dry
14266-14268	0.45	6.3	P, dry
14291-14307	19.11	1.7	P, damp
14308-14311	24.24	1.7	SW
14313-14328	25.60	1.7	SW
14329-14334	26.44	2.0	SWR
14336	19.09	2.8	P, damp
14338,14343	8.55	1.5	P, damp
14339,14344	8.70	1.5	SW
14340,14345	9.10	2.0	SW
14341-14342	9.50	2.1	SW
14346-14351	1.10	9.3	P, dry
14391-14409	1.01	2.7	P, damp
14410-14420	1.11	2.7	SW
14422-14426	1.14	2.8	SW
14427-14433	1.54	3.8	SW

Table 1 (continued)

Sample Numbers	Δm (gm/sq ft)	$\bar{v}_w$ (mi/hr)	Sample Type
14434-14442	2.19	4.8	SW
14444-14459	1.07	7.0	P, dry
14460-14463	2.20	4.8	SW
14464-14472	3.33	4.5	SWR
14512-14524	0.763	3.9	P, damp
14525-14535	1.02	5.1	SW
14536-14546	0.42	3.7	P, damp
14561-14570	1.33	3.9	P, damp
14592-14603	0.30	9.0	P, dry
14604-14607	0.30	9.0	PW
14614-14623	0.28	11.4	S, semidamp
14624	0.58	10.1	S, semidamp
14630-14641	0.12	7.5	P, damp
14655-14670	0.42	5.0	P, damp
14691-14707	0.16	6.3	P, dry
14709-14721	1.66	6.5	S, damp
14723-14727	0.36	5.4	P, damp
14723-14727	2.02	6.3	S, damp
14729-14737	2.98	7.8	S, semidamp
14753-14766	2.31	5.6	P, damp
14768-14781	3.94	6.2	SW
14783-14795	3.96	6.2	SWR
06014-06022	13.68	2.7	P, damp
06026,-27,-29-34	31.44	3.2	SW
06034A-06043	39.02	3.5	SWR
06057-06066	6.42	3.0	P, damp
06067-06073	7.03	3.4	SWR
06074-06078	9.26	4.1	SWR
06108-06113	0.84	6.2	P, dry
06114-06128	4.34	2.4	P, damp
06130-06134	14.81	2.2	P, damp
06136-06145	15.44	2.2	P, damp
06147-06162	16.70	2.4	SW
06164-06168	1.60	2.7	P, damp
06169-06171	1.44	2.7	S, damp
06169-06171	18.14	2.4	P, damp
06172-77,-81	9.32	1.8	2P, damp
06178-80,-82	9.16	1.8	2P, damp

Table 1 (continued)

Sample Numbers	Δm (gm/sq ft)	$\bar{v}_w$ (mi/hr)	Sample Type
06184-06191	11.90	2.4	SWR
06213-06227	7.69	1.4	P, damp
06229-06258	8.20	1.4	SW, SWR
06265-06279	5.84	1.5	P, damp
06332-06339	0.49	3.3	P, damp
06346-06347	0.49	3.3	PW
06348-06353	1.75	3.8	P, damp
06372-06379	0.34	3.0	S, damp
06381-06383	0.34	3.0	S, damp
06384-06397	0.51	3.0	P, damp
06399-06408	0.69	3.9	SW
06419-06430	0.23	3.8	P, damp
06438-06450	0.34	3.1	P, damp
06451-06459	0.49	3.9	SW
06461-06469	0.11	4.1	S, damp
06470-06471	0.60	4.0	SW
06492-06503	0.80	4.5	P, [illegible]
06506-06516	0.35	5.0	P, dry
06506-06516	1.15	4.6	2P, dry
06517-06518	1.15	4.6	P, dry
06523-06539	1.25	3.8	P, dry
06540-06541	1.68	4.0	S, dry
06543-06560	1.78	3.9	SW
06574-06593	2.11	2.8	P, damp
06574-06593	3.88	3.3	S, damp
06605-06614	0.96	3.4	P, damp
06626-06628	0.96	3.4	PW
06638-06651	0.36	3.6	S, semidamp
13504-13508	2.58	7.6	P, damp
15017-15026	1.93	3.5	S, semidamp
15027-15035	0.82	2.0	P, damp
15038-15049	0.77	3.9	P, dry
15052-15061	0.84	2.0	P, damp
15052-15061	1.61	2.5	2P, damp
15062-15089	1.61	2.5	2P, damp
15090	0.84	2.0	P, damp
15090	1.61	2.5	2P, damp
15091	1.08	3.0	SW

Table 1 (concluded)

Sample Numbers	Δm (gm/sq ft)	$\bar{v}_w$ (mi/hr)	Sample Type
15091	1.85	3.5	2PW
15098-15106	0.72	(2.5)[a]	S, dry
16006-16014	0.62	(2.0)	P, dry
16033-16166	0.62	(3.0)	P, dry
16289-16292	0.78	(4.8)	S, dry

a Values in parentheses are estimated

Table 2

TIME OF WEATHERING, AVERAGE WIND SPEED DURING WEATHERING PERIOD, INTEGRATED WIND SPEED, AND AMOUNT OF RAINFALL FOR THE FOLIAR SAMPLE SETS

Sample Numbers	t^{a} (hours)	$\bar{v}_w$ (mi/hr)	T (miles)	R (inches)
14049-14054	8.18	9.13	74.7	1.03
14079-14080	3.50	10.7	37.6	1.11
06026,-27,-29-34	8.67	4.35	37.7	-
06034A-06043	11.17	4.54	50.7	0.15
14139-14146	3.17	5.42	17.2	-
14147-14156	5.17	6.36	32.9	-
14158-14165	7.17	6.58	47.2	0.30
06067-06073	4.62	6.26	28.9	0.07
06074-06078	5.87	6.42	37.7	0.25
14179-14180	0.38	8.16	3.1	-
14181-14183	0.83	8.31	6.9	-
14184-14185	1.33	8.65	11.5	-
14186-14187	3.25	8.34	27.1	-
14188-14189	7.25	8.18	59.3	0.01
14190-14191	29.00	5.59	162.0	0.15
14227-14229	2.50	8.84	22.1	-
06147-06162	6.00	5.40	32.4	-
14245-14250	-	-	-	0.43
06184-06191	6.00	3.80	22.8	0.77
14252-14258	-	-	-	1.20
14308-14311	1.97	1.52	3.0	-
14313-14316	3.78	1.64	6.2	-
14317-14320	5.35	2.11	11.3	-
14321-14328	6.45	2.73	17.6	-
14329-14334	6.86	3.35	23.0	0.07

a Time of wind weathering up to time of beginning of rainfall or of sampling

Table 2 (continued)

Sample Numbers	t^a (hours)	$\bar{v}_w$ (mi/hr)	τ (miles)	R (inches)
06229-06238	4.13	2.69	11.1	-
06240-06250	9.47	2.92	27.7	0.02
06251-06258	9.75	2.88	28.1	0.54
14339	0.60	8.47	5.1	-
14340	1.13	8.69	9.8	-
14341	1.80	9.02	16.2	-
14342	2.13	9.21	19.6	-
14344	0.58	8.64	5.0	-
14345	1.13	8.79	9.9	-
14410-14420	1.40	3.64	5.1	-
14422-14426	2.83	4.30	12.2	-
14427-14433	4.83	5.43	26.2	-
14434-14442	5.82	5.72	33.3	-
14460-14463	7.27	6.49	47.2	-
14464-14472	9.30	6.29	58.5	0.35
14525-14535	5.95	7.65	45.5	-
06346-06347	24.50	4.16	102.0	-
14560	3.62	6.99	25.3	-
14604-14607	6.25	10.7	66.8	-
06399-06408	4.08	6.37	26.0	-
06414-06417	30.17	4.36	131.6	0.16
06432-06436	5.83	4.72	27.5	0.48
06451-06459	5.33	4.71	25.1	-
06469-06471	25.00	3.94	98.6	-
14685-14687	6.50	11.8	76.7	0.04
06543-06560	5.30	4.96	26.3	-
06626-06628	3.00	4.53	13.6	-

a Time of wind weathering up to time of beginning of rainfall or of sampling

Table 2 (concluded)

Sample Numbers	t^a (hours)	$\bar{v}_w$ (mi/hr)	τ (miles)	R (inches)
14739-14750	78.75	9.20	724.5	0.03
14768-14781	6.25	8.98	56.1	-
14783-14795	17.03	8.66	147.5	0.07
15064	9.58	3.34	32.0	-
16038-16045	1.58	5.32	8.4	-
16167-16229	2.12	5.71	12.1	-
16230-16288	5.46	5.15	28.1	-

a Time of wind weathering up to time of beginning of rainfall or of sampling

Table 3

FOLIAR CONTAMINATION DATA FOR PRIMARY SAMPLES OF PLANT FOLIAGE TAKEN UNDER DRY CONDITIONS

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			1. Agapanthus				
01146-1	-	1.0	-	0.0921	-	-	
			2. Bean				
01276-1		2.7		0.0995			0.038
01335-1		-		0.0359			0.106
01443-1		2.6		0.0230			0.024
01483-1		3.0		0.0172			0.105
01490-1		3.0		0.0661			0.105
01492-1		2.4		0.0427			0.105
13080-1		3.0		0.0407			0.035
13081-1		3.0		0.0479			0.079
13115-1		3.7		0.0673			0.053
13117-1		3.7		0.0762			0.053
13121-1		3.7		0.00513			0.053
13235-1		-		0.0163			0.017
13240-1		4.2		0.0594			0.017
13241-2		4.2		0.00273			0.0016
13243-1		4.2		0.126			0.017
13245-1		4.2		0.0362			0.017
24106-1		4.8		0.0304			0.036
14013	29	8.6	0.645	0.0395	1.94	0.0766	0.064

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
2. **Bean** (continued)							
14040-1	30	6.3	0.107	0.0880	2.57	0.226	0.025
14073-1	31	10.4	0.0856	0.140	2.05	0.287	0.118
14097-1	32	6.2	0.0833	0.152	2.00	0.304	0.074
14121	58	2.6	1.480	0.0303	4.44	0.135	0.070
14200-1,3	85	3.5	2.311	0.0452	6.93	0.313	0.020
14200-2	85	3.5	0.865	0.00913	6.06	0.055	0.0014
14200	85	3.5	4.329	0.0284	12.99	0.369	0.0113
14347	21	9.3	0.250	0.0503	0.750	0.0377	0.051
14446	50	7.0	1.021	0.0296	3.06	0.0906	0.022
14592	21	9.0	0.192	0.0344	0.576	0.0198	0.030
14691	89	6.3	1.613	0.0907	4.84	0.439	0.016
06499	57	4.5	0.503	0.103	1.51	0.156	0.036
06501	10	4.5	0.107	0.0472	0.321	0.0152	0.034
06512	57	4.6	0.380	0.105	1.14	0.120	0.036
06512	57	5.0	0.380	0.110	1.14	0.125	0.117
06513	10	4.6	0.100	0.0632	0.300	0.0190	0.034
06513	10	5.0	0.100	0.0994	0.300	0.0298	0.072
06526	11	3.8	0.0881	0.120	0.264	0.0317	0.034
06528	58	3.8	0.581	0.0862	1.74	0.150	0.036

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
3. Beet							
01334-1		1.0		0.0634			0.042
01444-1		2.6		0.0513			0.030
01485-1		3.0		0.0425			0.042
01487-1		3.0		0.0566			0.042
01494-1		2.4		0.116			0.042
13110-1		3.7		0.0813			0.040
13232-1				0.00810			0.037
13237-1		4.2		0.0803			0.037
24103-1		4.8		0.0318			0.075
14450	78	7.0	0.969	0.0496	0.969	0.048	0.035
14596	135	9.0	4.042	0.0951	4.042	0.384	0.0088
14696	171	6.3	3.547	0.0577	3.547	0.205	0.011
06111	20	6.2	0.228	0.0771	0.228	0.018	0.079
4. Bougainvillea							
01091-1				0.0317			0.012
01118-1				0.0201			0.035
01120-1				0.0110			0.0094
5. Cabbage							
01277-1		2.7		0.0425			0.042

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
5. Cabbage (continued)							
01333-1		1.0		0.0111			0.040
01442-1		2.6		0.0225			0.040
13114-1		3.7		0.0219			0.0067
13130		3.7	29.1	0.0122			0.0067
13247		4.2	34.3	0.0234			0.0052
14015	29	8.6	0.0964	0.0617	0.0482	0.00297	0.064
14043	30	6.3	0.0472	0.0690	0.0236	0.00163	0.098
14075	31	10.4	0.0814	0.0277	0.0407	0.00113	0.081
14103-1	32	6.2		0.166			0.081
14123	58	2.6	0.921	0.0300	0.460	0.0138	0.023
14202	85	8.9	12.87	0.0345	6.44	0.222	0.0073
14233	86	8.8	6.64	0.0125	3.32	0.0415	0.0042
14240	86	8.6	12.30	0.0244	6.15	0.150	0.0073
14268	90	6.3	13.22	0.0358	6.61	0.237	0.0073
14348	113	9.3	88.23	0.0141	44.12	0.622	0.016
14349	113	9.3	47.36	0.0142	23.68	0.336	0.0030
14453-1	142	7.0		0.0355	8.74	0.310	0.017
14453-2	142	7.0	41.95	0.00121	20.98	0.025	0.00080
14453-3	142	7.0	5.28	~0.00	2.64	0.000	-
14453	142	7.0	64.71	0.0104	32.36	0.336	0.0070
14707	57	6.3	1.862	0.0222	0.931	0.0207	0.013
06109	83	6.2	7.494	0.0472	3.75	0.177	0.016

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{V}_w$ (mi/hr)	m_p [a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
5. Cabbage (continued)							
06500	57	4.5	0.063	0.0700	0.0315	0.00220	0.050
06514	57	4.6	0.039	0.0686	0.0195	0.00134	0.050
06514	57	5.0	0.039	0.0652	0.0195	0.00127	0.106
06527	58	3.8	0.046	0.132	0.0230	0.00304	0.050
6. Camellia							
01340-1		1.0		0.0411			0.0070
7. Carrot							
01278-1		.2.7		0.0209			0.065
01337-1		1.0		0.0154			0.038
01445-1		2.6		0.0254			0.030
13084-1		3.0		0.0786			0.050
24102-1		4.8		0.0242			0.031
14602	135	9.0	0.918	0.00614	1.84	0.0113	0.022
14695	171	6.3	2.793	0.0324	5.59	0.181	0.019
06112	83	6.2	0.113	0.0276	0.226	0.00624	0.068
06496	142	4.5	0.766	0.0187	1.53	0.0286	0.028
06510	142	4.6	0.701	0.0178	1.40	0.0249	0.028
06510	142	5.0	0.701	0.0159	1.40	0.0223	0.028
06530	143	3.8	0.512	0.108	1.02	0.110	0.028

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			8. Corn				
24107		4.8		0.0459			0.018
14014	29	8.6	0.234	0.116	0.156	0.0181	0.28
14041	30	6.3	0.312	0.0368	0.208	0.00765	0.28
14076	31	10.4	0.123	0.0712	0.0820	0.00584	0.28
14101	32	6.2	0.268	0.129	0.179	0.0231	0.28
14122	58	2.6	0.495	0.171	0.330	0.0564	0.19
14203	85	8.9	22.01	0.0219	14.67	0.321	0.028
14234	86	8.8	2.89	0.0456	1.93	0.0880	0.028
14241	86	6.6	4.33	0.00731	2.89	0.0211	0.043
14456-1	142	7.0	0.215	0.0425	0.713	0.0303	0.036
14456-2	142	7.0	7.15	0.00813	4.77	0.0388	0.024
14456-3	142	7.0	7.92	0.0479	5.28	0.253	0.024
14456-4	142	7.0	0.418	0.248	0.279	0.0692	0.086
14456	142	7.0	16.55	0.0354	11.03	0.390	0.026
14600	58	9.0	0.784	0.108	0.523	0.0565	0.070
14699	57	6.3	8.12	0.0228	5.41	0.123	0.054
06492-1	119	4.5	2.66	0.00626	21.30	0.133	0.0091
06492-3	119	4.5	90.42	0.0127	60.28	0.766	0.0041
06492-4	119	4.5	17.54	0.00207	11.69	0.024	0.0062
06492	119	4.5	139.91	0.00987	93.27	0.921	0.0065
06493	94	4.5	23.27	0.0120	15.51	0.186	0.043
06506	94	4.6	14.46	0.0141	9.64	0.136	0.043

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			8. Corn (continued)				
06506	94	5.0	14.46	0.0188	9.64	0.181	-
06524	95	3.8	25.85	0.0262	17.23	0.451	0.047
06525-1,4	120	3.8	-	0.0345	17.82	0.615	0.0091
06525-3	120	3.8	44.92	0.00965	29.95	0.289	0.0062
06525	120	3.8	71.65	0.0189	47.77	0.903	0.0073
			9. Gardenia				
01341-1		1.0		0.0263			0.016
			10. Geranium				
01119-1				0.0670			0.018
01343-1		1.0		0.172			0.027
			11. Grass (Bermuda Type)				
01115-1				0.0208			0.026
			12. Grass (Quicuyo Pasture)				
13077-1		3.0		0.0786			0.049
13085-1		3.0		0.0873			0.049
13122-1		3.7		0.0706			0.049

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			13. Grass (Barley)				
14071	32	10.4	0.0929	0.0564	7.25	0.416	0.036
14093	33	6.2	0.0951	0.113	7.42	0.838	0.032
14127	59	2.6	0.583	0.0261	32.1	0.838	0.070
14705	57	6.3	0.465	0.0419	6.98	0.292	0.024
06536	58	3.8	-	0.0315	-	-	0.136
06537	58	3.8	0.315	0.0348	4.72	0.164	0.136
			14. Grass (Oats)				
14070	32	10.4	0.163	0.0276	13.7	0.378	0.060
14092	33	6.2	0.155	0.0513	13.0	0.667	0.046
14126	59	2.6	0.305	0.0270	23.2	0.626	0.030
14603	19	9.0	0.0246	0.0260	1.97	0.0512	0.031
14703	55	6.3	0.378	0.0190	18.9	0.359	0.047
06503	53	4.5	0.235	0.0535	11.8	0.631	0.026
06516	57	4.6	0.295	0.0444	14.8	0.657	0.026
06516	57	5.0	0.295	0.0236	14.8	0.349	-
06535	58	3.8	0.276	0.0429	13.8	0.592	0.026
			15. Grass (Rye)				
14019	30	8.6	0.0747	0.0998	6.61	0.660	0.218

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p [a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			15. Grass (Rye) (continued)				
14069	32	10.4	0.0773	0.0704	7.07	0.498	0.118
14094	33	6.2	0.0725	0.112	5.80	0.650	0.118
14125	59	2.6	0.130	0.0239	18.2	0.435	0.149
			16. Grass (Wheat)				
14017	30	8.6	0.0585	0.0779	5.67	0.442	0.117
14018	30	8.6	0.0564	0.112	3.55	0.398	0.117
14067	32	10.4	0.0617	0.0229	9.17	0.210	0.061
14068	32	10.4	0.0507	0.0456	6.96	0.317	0.076
14091	33	6.2	0.0565	0.0721	4.04	0.291	0.067
14124	59	2.6	0.313	0.0502	22.4	1.124	0.030
14704	56	6.3	0.318	0.0550	7.50	0.412	0.0097
06502	56	4.5	0.310	0.0238	7.10	0.169	0.0089
06515	56	4.6	0.326	0.0270	7.47	0.202	0.0089
06515	56	5.0	0.326	0.0343	7.47	0.256	-
06534	57	3.8	0.424	0.0481	9.71	0.467	0.0089
			17. Lettuce				
01279-1	-	2.7	-	0.0450	-	-	0.116
01446-1		2.6		0.0726			0.034

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
17. Lettuce (continued)							
01495-1		2.4		0.0497			0.064
13112-1		3.7		0.0572			0.143
13113-1		3.7		0.0792			0.143
13238-1		4.2		0.0491			0.064
14452	78	7.0	0.296	0.102	0.592	0.0604	0.044
14597	135	9.0	4.38	0.121	4.38	0.488	0.206
14697	171	6.3	15.71	0.0634	9.43	0.598	0.029
06113	83	6.2	0.159	0.243	0.318	0.0773	0.168
18. Onion							
24104-1		4.8		0.0143			0.033
14449	142	7.0	0.459	0.00907	2.75	0.0249	0.019
14595	199	9.0	1.91	0.00858	3.82	0.0328	0.0062
14694	235	6.3	4.84	0.00235	9.68	0.0227	0.0052
06110	83	6.2	0.0279	0.0562	0.335	0.0188	0.077
19. Pea							
14599	53	9.0	0.819	0.0404	1.23	0.0497	0.011
14700	57	6.3	4.37	0.0257	6.56	0.169	0.012
14701-2	89	6.3	0.570	0.00209	6.41	0.0134	0.0020

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p [a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
19. Pea (continued)							
14702	89	6.3	10.5	0.0243	15.8	0.384	-
06494	57	4.5	4.35	0.0158	6.52	0.103	0.0068
06507	57	4.6	6.15	0.0237	9.22	0.219	0.0068
06507	57	5.0	6.15	0.0416	9.22	0.384	-
06523	58	3.8	3.99	0.0246	5.98	0.147	0.0094
06533-2	90	3.8	0.516	0.00783	5.80	0.0454	0.0017
20. Pepper							
14448	78	7.0	0.0515	0.0133	0.0772	0.00103	0.036
14594	135	9.0	0.275	0.0837	0.412	0.0345	0.016
14693	171	6.3	0.657	0.0127	0.986	0.0125	0.034
06497	170	4.5	0.438	0.0316	0.657	0.0208	0.034
21. Potato							
01275-1		2.7		0.0839			0.120
01338-1		1.0		0.0690			0.031
01447-1		2.6		0.0684			0.022
01484-1		3.0		0.0692			0.038
01486-1		3.0		0.0653			0.038
01489-1		3.0		0.108			0.038

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
21. Potato (continued)							
13079-1		3.0		0.0645			0.038
13082-1		3.0		0.182			0.108
13111-1		3.7		0.0921			0.034
13116-1		3.7		0.114			0.067
13118-1		3.7		0.179			0.067
13233-1				0.0497			0.024
13239-1		4.2		0.0804			0.024
13244-1		4.2		0.127			0.024
13246-1		4.2		0.0678			0.024
24105-1		4.8		0.0560			0.063
14598	53	9.0	0.876	0.163	0.438	0.0714	0.037
14698	89	6.3	2.326	0.0546	1.16	0.0633	0.065
06495	89	4.5	5.210	0.0706	2.60	0.184	0.037
06508	89	4.6	3.342	0.0468	1.67	0.0782	0.037
06509	89	4.6	4.430	0.0494	2.22	0.110	0.037
06531	90	3.8	2.626	0.174	1.31	0.228	0.037
06532	90	3.8	4.975	0.0988	2.49	0.246	0.037
22. Radish							
14593	53	9.0	0.284	0.0344	1.14	0.0392	0.051
14692	89	6.3	1.05	0.0374	4.20	0.157	0.057

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
22. Radish (continued)							
06498	89	4.5	1.51	0.0358	6.04	0.216	0.045
06511	89	4.6	1.59	0.0498	6.36	0.317	0.045
06511	89	5.0	1.59	0.0814	6.36	0.518	-
06529	90	3.8	1.40	0.132	5.60	0.739	0.045
23. Rose							
01045-1				0.0106			0.0010
01339-1		1.0		0.0451			0.023
13120-1		3.7		0.0274			0.010
24. Squash (Zucchini)							
14012	29	8.6	1.261	0.0204	0.948	0.0193	0.148
14039-1	30	6.3	0.229	0.162	0.859	0.139	0.060
14072-1	31	10.4	0.212	0.0269	0.795	0.0214	0.100
14095-1	32	6.2	0.206	0.221	0.772	0.171	0.100
14120	58	2.6	1.54	0.0576	1.15	0.0662	0.121
14198-1	85	8.9	0.988	0.0771	2.22	0.171	0.033
14199-2	85	8.9	0.262	0.0884	0.196	0.0173	-
14231-1	86	8.8	0.252	0.0838	0.567	0.0475	0.021
14231	86	8.8	1.665	0.0809	0.416	0.0337	0.021
14239-1	86	8.6	0.609	0.0624	1.37	0.0855	0.033

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			24. Squash (Zucchini) (continued)				
14266-1(1)	90	6.3	0.800	0.146	1.60	0.234	0.033
14266-1(2)	90	6.3	1.146	0.133	2.29	0.305	0.033
14266-1(3)	90	6.3	0.557	0.237	1.11	0.263	0.033
14266-1(4)	90	6.3	1.381	0.0313	2.76	0.0864	0.033
14266-1(5)	90	6.3	0.979	0.150	1.96	0.294	0.033
14266-1(6)	90	6.3	1.142	0.00799	2.28	0.0182	0.033
14266-1(7)	90	6.3	1.270	0.0957	2.54	0.243	0.033
14266-1(8)	90	6.3	1.332	0.0546	2.66	0.145	0.033
14266-1	90	6.3	1.076	0.0924	2.15	0.199	0.033
14266-2	90	6.3	0.636	0.112	0.159	0.0179	-
14266	90	6.3	9.24	0.0937	2.31	0.216	0.031
14336	110	2.8	40.34	0.0505	10.1	0.510	0.056
14346	113	9.3	20.50	0.0295	5.12	0.151	0.015
14350-1	113	9.3	1.36	0.0452	3.40	0.154	0.056
14351-1	113	9.3	1.17	0.0620	2.92	0.181	0.056
14444-2	142	7.0	3.14	0.0208	5.50	0.114	0.0021
14445-1	142	7.0	2.27	0.0728	5.68	0.414	0.027
14451-2	142	7.0	23.63	0.00140	11.8	0.0165	0.0021
06108-1	83	6.2	0.354	0.108	1.92	0.207	0.064

a Gm/plant part for other than whole plant samples

Table 3 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
25. Tomato							
13119-1		3.7		0.0564			0.021
13234-1				0.0439			0.081
13242-1		4.2		0.0476			0.081
24108-1		4.8		0.0506			0.215
14016	29	8.6	0.0324	0.0571	0.194	0.0111	0.257
14042	30	6.3	0.0266	0.0355	0.160	0.00568	0.072
14074	31	10.4	0.0252	0.139	0.151	0.0210	0.345
14099	32	6.2	0.0271	0.125	0.163	0.0204	0.306
14447	78	7.0	1.141	0.116	1.14	0.132	0.070
26. Barley							
14236-2	87	8.8	0.476	0.00525	14.3	0.0750	0.245
14243-2	87	8.7	0.734	0.00584	22.0	0.129	0.245
27. Oats							
14237-2	87	8.8	0.243	0.00823	7.28	0.0599	0.0068
14244-2	87	8.7	0.377	0.00312	11.3	0.0353	0.0068
28. Rye							
06539	235	3.8	1.24	0.0152	-	-	0.012

a Gm/plant part for other than whole plant samples

Table 3 (concluded)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
28. Rye (continued)							
14601-2	200	9.0	0.268	0.0731	-	-	0.038
14706-2	236	6.3	0.492	0.0501	-	-	0.0096
06538-2	235	3.8	0.315	0.0486	-	-	0.021
29. Wheat							
14235-2	87	8.8	0.120	0.00672	3.60	0.0242	0.084
14242-2	87	8.7	0.178	0.00372	5.34	0.0199	0.084

a Gm/plant part for other than whole plant samples

Table 4

FOLIAR CONTAMINATION DATA FOR PRIMARY SAMPLES OF PLANT FOLIAGE TAKEN UNDER DAMP CONDITIONS

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			1. Bean				
01177-1	-	2.4	-	0.0658	-	-	0.033
01258-1		1.5		0.206			0.092
01315-1		1.0		0.178			0.041
01356-1		1.0		0.0331			0.056
01425-1		2.5		0.102			0.068
01450-1		1.0		0.0423			0.024
01464-1		1.0		0.0801			0.105
01476-1		1.0		0.203			0.105
01507-1		1.0		0.0693			0.105
01547-1		1.0		0.142			0.049
01549-1		1.0		0.0470			0.027
01555-1		1.5		0.169			0.093
13162		3.2	7.612	0.0167			0.021
13163-1		3.2		0.107			0.053
13166-1		3.2		0.0950			0.021
13193-1				0.142			0.021
13196-1				0.0688			0.021
13197-1				0.0766			0.021
13279-1		3.5		0.217			0.012

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
1. Bean (continued)							
13280-1		3.5		0.122			0.012
13281-1		3.5		0.0585			0.012
13288-1		3.5		0.152			0.012
13290-1		3.5		0.121			0.012
13296-1		4.1		0.173			0.033
13297-1		4.1		0.235			0.033
13298-1		4.1		0.192			0.033
13299-1		4.1		0.0769			0.033
24087-1		3.4		0.0839			0.036
24135-1		4.5		0.0924			0.066
24148-1		5.2		0.344			0.066
24196-1		7.0		0.0454			0.069
14085-1	32	7.3	0.0838	0.0782	2.01	0.157	0.074
14098-1	32	7.0	0.0774	0.147	1.86	0.273	0.074
14130-1,3	59	3.0	0.982	0.110	2.95	0.324	0.167
14130-2	59	3.0	0.472	0.00352	4.96	0.0175	-
14130	59	3.0	2.634	0.0432	7.90	0.341	0.062
14294	17	1.7	0.161	0.162	0.483	0.0782	0.051
14402	50	2.7	1.119	0.174	3.36	0.585	0.022
14632	24	7.5	0.290	0.143	0.870	0.124	0.031
14723	93	5.4	3.715	0.0282	11.14	0.314	0.016
14724	61	5.4	1.232	0.0217	3.70	0.080	0.090

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			1. Bean (continued)				
14753	98	5.6	5.553	0.0217	16.66	0.362	0.030
14754	66	5.[illegible]	1.044	0.0337	3.13	0.105	0.049
06016	30	2.7	0.275	0.112	0.826	0.0925	0.088
06058	57	3.0	0.577	0.0433	1.73	0.0749	0.101
06219	18	1.4	0.135	0.0780	0.405	0.0316	0.051
06334	29	3.3	0.256	0.0913	0.768	0.070	0.054
06348	34	3.8	0.364	0.0288	1.09	0.031	0.034
06391	56	3.0	2.000	0.0393	6.00	0.236	0.026
06392	25	3.0	0.172	0.0797	0.516	0.0411	0.038
06425	27	3.8	0.216	0.193	0.648	0.125	0.038
06426	58	3.8	1.472	0.0417	4.42	0.184	0.019
06443	28	3.1	0.211	0.0730	0.633	0.0462	0.038
06444	59	3.1	0.835	0.0427	2.50	0.107	0.019
06582	12	2.8	0.0708	0.0492	0.212	0.0104	0.157
06583	12	2.8	0.0959	0.0955	0.288	0.0275	0.022
06584	59	2.8	0.420	0.0494	1.26	0.0622	0.147
06585	59	2.8	0.628	0.0872	1.88	0.164	0.026
06610	14	3.4	0.0856	0.0526	0.257	0.0135	0.192
			2. Beet				
01313-1	-	1.0	-	0.211	-	-	0.042

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			2. Beet (continued)				
01357-1		1.0		0.184			0.042
01426-1		2.5		0.111			0.037
01451-1		1.0		0.0569			0.030
01465-1		1.0		0.128			0.042
01478-1		1.0		0.117			0.042
01504-1		1.0		0.215			0.090
01505-1		1.0		0.187			0.090
01557-1		1.5		0.130			0.056
13156-1		3.2		0.141			0.068
13186-1				0.164			0.068
13198-1				0.0995			0.068
13286-1		3.5		0.122			0.037
24086-1		3.4		0.141			0.075
24139-1		4.5		0.0788			0.075
24145		5.2		0.323			0.032
14405	78	2.7	2.671	0.129	2.671	0.345	0.021
14515	111	3.9	2.038	0.0694	2.038	0.141	0.022
14539	113	3.7	1.896	0.0480	1.896	0.0910	0.022
14563	116	3.9	8.022	0.0187	8.022	0.150	0.022
14636	137	7.5	4.966	0.0243	4.966	0.121	0.0088
14758	180	5.6	6.559	0.0271	6.559	0.178	0.019
06117	21	2.4	0.183	0.0765	0.183	0.0140	0.079

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
2. Beet (continued)							
06136	22	2.2	0.310	0.109	0.310	0.0338	0.079
06174	23	1.8	0.180	0.0922	0.180	0.0166	0.079
06215	45	1.4	0.947	0.0982	0.947	0.0930	0.062
06270	48	1.5	1.823	0.0840	1.823	0.153	0.020
3. Bougainvillea							
01147-1	-	1.0	-	0.0825	-	-	0.038
4. Cabbage							
01179-1		2.4		0.0401			0.015
01260-1		1.5		0.0471			0.019
01352-1		1.0		0.0293			0.029
01424-1		2.5		0.0406			0.029
01449-1		1.0		0.0322			0.023
01463-1		1.0		0.0367			0.023
01480-1		1.0		0.0415			0.023
24084-1		3.4		0.0205			0.026
24141-1		4.5		0.0353			0.020
24200-1		7.0		0.0261			0.020
14088	32	7.3	0.0912	0.218	0.0456	0.00994	0.081
14104-1	32	7.0	-	0.188	-	-	0.081

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
4. Cabbage (continued)							
14129	59	3.0	0.737	0.0993	0.369	0.0366	0.029
14295	109	1.7	50.59	0.0283	25.30	0.716	0.016
14406-1	142	2.7	-	0.0565	13.70	0.774	0.026
14406-2	142	2.7	55.80	0.00944	27.90	0.263	0.0012
14406-3	142	2.7	9.78	0.00388	4.89	0.019	0.023
14406	142	2.7	92.98	0.0227	46.49	1.055	0.0107
14726	61	5.4	2.092	0.0754	1.05	0.0792	0.042
14755	66	5.6	4.369	0.0253	2.18	0.0552	0.013
06015	30	2.7	0.0366	0.128	0.0183	0.00234	0.081
06064	57	3.0	0.434	0.122	0.217	0.0265	0.014
06118	84	2.4	13.39	0.0474	6.70	0.318	0.016
06139	85	2.2	4.625	0.0733	2.31	0.169	0.0073
06165	85	2.7	5.011	0.0823	2.51	0.207	0.0073
06176	86	1.8	3.411	0.109	1.71	0.186	0.0073
06217	108	1.4	26.34	0.0224	13.17	0.295	0.016
06580	59	2.8	0.0358	0.170	0.0179	0.00304	0.050
5. Camellia							
01310-1	-	1.0	-	0.0417	-	-	0.0070
01320-1		1.0		0.0668			0.0070
01509-1		1.0		0.0134			0.0074

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p^a (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
6. Carrot							
01180-1		2.4		0.0791			0.065
01259-1		1.5		0.169			0.051
01316-1		1.0		0.0486			0.027
01353-1		1.0		0.0182			0.027
01427-1		2.5		0.0158			0.093
01452-1		1.0		0.0445			0.030
01467-1		1.0		0.0526			0.030
01477-1		1.0		0.0618			0.122
24082-1		3.4		0.0677			0.031
24138-1		4.5		0.0847			0.150
24144-1		5.2		0.114			0.067
24198-1		7.0		0.0527			0.067
14516	111	3.9	0.529	0.0559	1.06	0.0593	0.025
14564	116	3.9	0.880	0.0662	1.76	0.117	0.025
14637	137	7.5	0.968	0.0344	1.94	0.0667	0.026
14759	180	5.6	1.687	0.0271	3.37	0.0913	0.020
06115	84	2.4	0.157	0.117	0.314	0.0367	0.068
06138	85	2.2	0.0864	0.138	0.173	0.0239	0.068
06167	85	2.7	0.265	0.0763	0.530	0.0404	0.068
06173	86	1.8	0.137	0.167	0.274	0.0458	0.068
06214	108	1.4	0.01	0.0893	1.20	0.107	0.082
06269	111	1.5	0.875	0.108	1.75	0.189	0.082

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
6. Carrot (continued)							
06442	113	3.1	0.368	0.145	0.736	0.107	0.022
06578	144	2.8	0.312	0.110	0.624	0.0686	-
06579	144	2.8	0.471	0.140	0.942	0.132	0.027
06608	146	3.4	0.918	0.0558	1.84	0.103	0.046
7. Corn							
24089-1	-	3.4	-	0.0446	-	-	0.018
24142-1		4.5		0.0632			0.098
24150-1		5.2		0.0500			0.033
24202-1		7.0		0.0156			0.045
14087	32	7.3	0.322	0.152	0.215	0.0327	0.28
14102	32	7.0	0.185	0.0872	0.123	0.0107	0.28
14128	59	3.0	0.348	0.235	0.232	0.0545	0.190
14300-1	109	1.7	-	0.0803	3.59	0.288	0.047
14300-2	109	1.7	6.31	0.00447	4.21	0.019	0.024
14300-3	109	1.7	12.47	0.00411	8.31	0.034	0.030
14300-4	109	1.7	0.628	0.0432	0.419	0.018	0.113
14300	109	1.7	24.79	0.0217	16.53	0.359	0.034
14518	34	3.9	0.126	0.304	0.0840	0.0255	0.056
14542	36	3.7	0.0982	0.218	0.0655	0.0143	0.056
14566	39	3.9	0.198	0.146	0.132	0.0193	0.056

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNK}
			7. Corn (continued)				
14762	103	5.6	13.55	0.0335	9.03	0.302	0.023
06014	30	2.7	0.163	0.189	0.109	0.0206	0.14
06059	57	3.0	1.341	0.100	0.894	0.0894	0.17
06121	84	2.4	15.37	0.0246	10.25	0.252	0.077
06145	85	2.2	12.99	0.0478	8.66	0.414	0.043
06168	85	2.7	9.34	0.0757	6.23	0.472	0.043
06181	86	1.8	2.29	0.0727	1.53	0.111	0.043
06267-1	111	1.5	1.33	0.0668	7.11	0.475	0.025
06267-2,3	111	1.5	1.33	0.00250	18.67	0.047	0.021
06267-4	111	1.5	1.52	0.0218	1.01	0.022	0.059
06267	111	1.5	40.21	0.0203	26.81	0.544	0.024
06332	59	3.3	0.619	0.195	0.413	0.0805	0.056
06349	64	3.8	0.493	0.0596	0.329	0.0196	0.030
06387-1	86	3.0	2.10	0.00583	9.80	0.0571	0.035
06387-3	86	3.0	14.70	0.0344	9.80	0.337	0.013
06387	86	3.0	29.40	0.0202	19.60	0.396	0.024
06388	61	3.0	1.86	0.114	1.24	0.141	0.070
06420	63	3.8	3.10	0.172	2.07	0.356	0.070
06439	64	3.1	1.19	0.214	0.793	0.170	0.070
06575-1	96	2.8	0.901	0.0689	4.21	0.290	-
06575-3	96	2.8	1.15	0.0513	0.767	0.0393	-
06575	96	2.8	7.46	0.0662	4.97	0.329	-

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
7. Corn (continued)							
06576	96	2.8	5.19	0.0649	3.46	0.225	-
06605-1,4	123	3.4	-	0.0402	21.51	0.865	0.014
06605-3	123	3.4	41.34	0.00136	27.56	0.0375	0.024
06605	123	3.4	73.60	0.0184	49.07	0.903	0.020
8. Gardenia							
01470-1		1.6		0.0409			0.013
01512	-	1.0	-	0.00815	-	-	0.013
9. Geranium							
01097-1				0.0560			0.0090
01148-1	-	1.0	-	0.0821	-	-	0.017
01322-1		1.0	-	0.346	-	-	0.027
01510-1		1.0		0.503			0.059
10. Grass (Bermuda Type)							
01143-1	-	1.0	-	0.217			0.046

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{V}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			11. Grass (Quicuyo Pasture)				
13039-1				0.0344			0.024
13052-1		3.8		0.146			0.098
13067-1		4.0		0.118			0.061
13169-1		3.2		0.148			0.053
13202-1		4.1		0.158			0.058
13291-1		3.5		0.104			0.090
13303-1		4.1		0.0550			0.090
			12. Grass (Barley)				
14136	60	3.0	0.473	0.0353	26.0	0.918	0.040
14194	66	3.5	0.494	0.0345	27.1	0.935	0.040
06021	31	2.7	0.101	0.0466	7.88	0.367	0.026
06066	58	3.0	0.516	0.0405	24.6	0.996	0.039
06427	26	3.8	0.0544	0.185	2.72	0.503	0.038
06446	27	3.1	0.0657	0.132	3.28	0.433	0.038
06590	59	2.8	0.285	0.0483	4.28	0.207	0.032
06613	61	3.4	0.403	0.0577	6.04	0.348	0.186
			13. Grass (Oats)				
14137	60	3.0	0.495	0.0205	37.6	0.771	0.028

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
13. Grass (Oats) (continued)							
14195	66	3.5	0.604	0.0180	45.9	0.826	0.030
14638	21	7.5	0.0283	0.0450	2.26	0.102	-
14764	64	5.6	0.432	0.0519	19.2	0.996	0.034
06020	31	2.7	0.0787	0.0351	6.61	0.232	0.032
06065	58	3.0	0.408	0.0272	31.0	0.843	0.032
06589	59	2.8	0.222	0.0635	11.1	0.705	0.022
06612	61	3.4	0.360	0.0141	18.0	0.254	-
14. Grass (Rye)							
14082	33	7.3	0.0678	0.0563	6.40	0.360	0.118
06022	31	2.7	0.0493	0.0472	3.52	0.166	0.052
14196	66	3.5	0.117	0.0571	16.4	0.936	0.071
06063	58	3.0	0.163	0.0351	28.5	1.00	0.184
06144	86	2.2	-	0.0788	-	-	0.147
15. Grass (Wheat)							
14081	33	7.3	0.0563	0.0837	6.91	0.578	0.067
14135	60	3.0	0.250	0.0574	27.8	1.60	0.030
14197	66	3.5	0.305	0.0298	33.9	1.01	0.030
06019	31	2.7	0.0842	0.0517	5.05	0.261	0.044

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
15. Grass (Wheat) (continued)							
06062	58	3.0	0.347	0.0263	32.3	0.849	0.041
06588	58	2.8	0.404	0.0289	9.25	0.267	0.0087
16. Lettuce							
01178-1	-	2.4	-	0.114	-	-	0.046
01261-1		1.5		0.140			0.061
01309-1		1.0		0.129			0.111
01314-1		1.0		0.184			0.078
01355-1		1.0		0.267			0.113
01428-1		2.[illegible]		0.0725			0.113
01453-1		1.0		0.0614			0.034
01466-1		1.0		0.298			0.186
01506-1		1.0		0.153			0.118
13083-1		3.0		0.167			0.064
13157-1		3.2		0.0955			0.052
13158-1		3.2		0.0638			0.052
13159-1		3.2		0.0859			0.052
13187-1		4.1		0.193			0.052
13188-1		4.1		0.321			0.052
13189-1		4.0		0.245			0.052
13201-1		4.1		0.126			0.052

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p [a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
16. Lettuce (continued)							
13283-1		3.5		0.284			0.080
13302-1		4.1		0.0721			0.080
24088-1		3.4		0.146			0.115
24137-1		4.5		0.0715			0.115
14404	78	2.7	0.196	0.423	0.392	0.166	0.034
14517	111	3.9	0.800	0.165	1.60	0.264	0.206
14540	113	3.7	1.709	0.0980	3.42	0.335	0.206
14565	116	3.9	2.489	0.0979	4.98	0.488	0.206
14631	137	7.5	5.31	0.0931	5.31	0.494	-
14760	180	5.0	23.01	0.0671	13.81	0.927	0.087
06114	84	2.4	0.152	0.189	0.304	0.0575	0.168
06134	85	2.2	0.200	0.168	0.400	0.0672	0.168
06166	85	2.7	0.158	0.159	0.316	0.0502	0.168
06172	86	1.8	0.158	0.281	0.316	0.0888	0.168
06213	108	1.4	0.297	0.184	0.594	0.109	0.068
06268	111	1.5	0.345	0.221	0.690	0.152	0.068
17. Onion							
24085-1	-	3.4	-	0.0402	-	-	0.034
24140-1		4.5		0.0309			0.012
24146-1		5.2		0.159			0.012
24201-1		7.0		0.0256			0.040

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_I (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			17. Onion (continued)				
14296	109	1.7	0.144	0.0136	0.864	0.0118	0.034
14403	142	2.7	0.482	0.0175	2.89	0.0506	0.019
14514	175	3.9	0.678	0.0165	1.36	0.0224	0.013
14538	177	3.7	1.960	0.0115	3.92	0.0451	0.013
14562	180	3.9	1.7[illegible]	0.00882	3.50	0.0309	0.013
14634	201	7.5	1.52	0.00696	3.04	0.0212	-
14757	244	5.6	6.34	0.00279	12.68	0.0354	0.0044
06061	57	3.0	0.0158	0.0215	0.190	0.00408	0.043
06116	84	2.4	0.0485	0.0109	0.582	0.00634	0.077
06137	85	2.2	0.0316	0.00695	0.379	0.0026[illegible]	0.077
0617[illegible]	86	1.8	0.0844	0.00383	1.013	0.00388	0.077
06216	108	1.4	0.180	0.0405	1.08	0.0437	0.026
06271	111	1.5	0.216	0.0390	1.30	0.0507	0.017
			18. Pea				
14519	29	3.9	0.197	0.0635	0.296	0.0188	0.011
14541	31	3.7	0.192	0.0586	0.288	0.0169	0.011
14567	34	3.9	0.292	0.0354	0.438	0.0155	0.011
14630	55	7.5	1.05	0,0238	1.58	0.0376	-
14763	66	5.6	7.54	0.00989	11.3	0.112	0.0094
06333	29	3.3	0.142	0.114	0.213	0.0243	0.011

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			18. Pea (continued)				
06350	31	3.8	0.208	0.0261	0.312	0.00814	0.011
06384	24	3.0	0.237	0.0702	0.356	0.0250	0.013
06386	56	3.0	1.83	0.0350	2.74	0.0959	0.011
06419	58	3.8	1.86	0.0505	2.79	0.141	0.011
06421	26	3.3	0.271	0.0975	0.406	0.0396	0.013
06438	59	3.1	1.46	0.0224	2.19	0.0491	0.011
06440	27	3.1	0.249	0.0544	0.374	0.0203	0.013
06574	59	2.8	5.92	0.0145	8.88	0.129	-
06586-2[b]	91	2.8	0.439	0.00194	4.94	0.00958	-
06587-2[c]	91	2.8	0.450	0.00362	5.06	0.0183	-
06606	61	3.4	4.78	0.0541	7.17	0.388	0.010
06614-2	93	3.4	0.486	0.00858	5.47	0.0469	0.0017
			19. Pepper				
14513	111	3.9	0.136	0.169	0.204	0.0345	0.086
14537	113	3.7	0.140	0.159	0.210	0.0334	0.086
14635	137	7.5	0.212	0.121	0.318	0.0385	-
14725	175	5.4	1.262	0.0304	1.89	0.0575	-
14756	180	5.6	0.891	0.0216	1.34	0.0289	-
06389	137	3.0	1.352	0.0389	2.03	0.0790	0.016
06423	139	3.8	0.348	0.118	0.522	0.0616	0.016

a Gm/plant part for other than whole plant samples
b Protected pods
c Exposed pods

Table 4 (continued)

Sample Number	Age (days)	v_w (mi/hr)	m_p^a (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
20. Potato							
01176-1	-	2.4	-	0.131	-	-	0.061
01257-1		1.5		0.246			0.052
01317-1		1.0		0.150			0.031
01354-1		1.0		0.122			0.032
01429-1		2.5		0.0746			0.032
01454-1		1.0		0.104			0.022
01468-1		1.0		0.0938			0.121
01475-1		1.0		0.269			0.121
01503-1		1.0		0.256			0.058
01508-1		1.0		0.0917			0.058
01548-1		1.0		0.190			0.020
01550-1		1.0		0.251			0.030
01556-1		1.5		0.177			0.087
01560-1		3.7		0.167			0.052
13160-1		3.2		0.0828			0.053
13161-1		3.2		0.0877			0.053
13165-1		3.2		0.181			0.053
13167-1		3.2		0.131			0.053
13190-1		4.1		0.272			0.053
13192-1		4.1		0.259			0.053
13194-1		4.1		0.223			0.053
13199-1		4.1		0.0419			0.053

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
20. Potato (continued)							
13200-1		4.1		0.0343			0.053
13200		4.1	5.214	0.102			0.053
13278-1		3.5		0.183			0.032
13284-1		3.5		0.157			0.032
13289-1		3.5		0.120			0.032
13293-1		4.1		0.253			0.032
13294-1		4.1		0.194			0.032
13295-1		4.1		0.110			0.032
24083-1		3.4		0.0801			0.083
24134-1		4.5		0.0827			0.018
24147-1		5.2		0.213			0.068
24197-1		7.0		0.0688			0.076
14761	98	5.6	2.260	0.0669	1.13	0.0756	0.050
06385	56	3.0	4.164	0.0445	2.08	0.0926	0.037
06422	58	3.8	1.327	0.228	0.664	0.151	0.037
06441	59	3.1	1.455	0.167	0.728	0.122	0.037
06577	91	2.8	7.657	0.0879	3.83	0.337	-
06607	93	3.4	3.548	0.0914	1.77	0.161	0.057
21. Radish							
14633	55	7.5	0.363	0.0378	1.45	0.0548	-

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{V}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			21. Radish (continued)				
14633	55	7.5	0.36[illegible]	0.0378	1.45	0.0548	-
06390	56	3.0	0.45[illegible]	0.0793	1.81	0.144	0.051
06424	58	3.8	0.35[illegible]	0.340	1.40	0.476	0.051
06445	59	3.1	0.242	0.116	0.969	0.112	0.051
06581	91	2.8	0.600	0.136	2.40	0.326	-
06609	93	3.4	1.50	0.146	6.00	0.876	-
			22. Rose				
01044-1				0.0368			0.0010
01145-1	-	1.0	-	0.0493	-	-	0.020
01311 1		1.0		0.0475			0.023
01318-1		1.0		0.0314			0.023
13164-1		3.2		0.0338			0.010
13195-1				0.0461			0.010
			23. Squash (Zucchini)				
14083-1	32	7.3	0.107	0.115	0.401	0.0461	0.100
14084-1	32	7.3	0.139	[illegible].267	0.521	0.139	0.100
14096-1	32	7.0	0.188	0.226	0.705	0.159	0.100
14134	59	3.0	0.766	0.0966	0.574	0.0554	0.100
14291-1	109	1.7	1.41	0.178	3.52	0.627	0.124
14292-2	109	1.7	1.08	0.0172	2.16	0.0372	0.0072

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			23. Squash (Zucchini) (continued)				
14293-2*	109	1.7	0.156	0.172	0.0975	0.0168	-
14343-1	113	1.5	2.12	0.166	5.30	0.880	0.056
14399-1	142	2.7	1.86	0.187	4.66	0.871	0.020
14400-1	142	2.7	2.36	0.121	5.90	0.714	0.020
14409-2*	142	2.7	0.300	0.186	0.188	0.0350	-
14512-1	111	3.9	1.23	0.0792	3.08	0.244	0.036
14536-1	113	3.7	2.48	0.141	6.20	0.874	0.036
14561-1	116	3.9	1.92	0.0906	4.80	0.435	0.036
06017	30	2.7	0.195	0.215	0.146	0.0314	0.094
06057	57	3.0	4.139	0.174	3.10	0.539	0.111
06119-1	84	2.4	0.944	0.216	2.12	0.458	0.064
06120-2*	84	2.4	0.230	0.146	0.144	0.0210	-
06140-1	85	2.2	0.834	0.168	1.88	0.316	0.033
06157-2	85	2.4	0.787	0.0275	0.590	0.0162	-
06158-2*	85	2.4	0.273	0.240	0.171	0.0410	-
06164-1	85	2.7	0.580	0.324	1.30	0.421	0.033
06177-1	86	1.8	0.536	0.219	1.21	0.265	0.033
06218-1	108	1.4	1.28	0.163	3.20	0.522	0.056
			24. Tomato				
13168-1	-	3.2	-	0.0657			0.030
13191-1				0.130			0.030
13282-1		3.5		0.0751			0.048

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft.)	F_L	C^o_{PNR}
			24. Tomato (continued)				
13285-1		3.5		0.106			0.048
13287-1		3.5		0.0692			0.048
13300-1		4.1		0.0552			0.048
13301-1		4.1		0.0793			0.048
24090-1		3.4		0.200			0.215
24136-1		4.5		0.174			0.400
24149-1		5.2		0.134			0.400
24199-1		7.0		0.0611			0.051
14086	32	7.3	0.0254	0.206	0.152	0.0313	0.306
14100	32	7.0	0.0297	0.0929	0.178	0.0165	0.306
14132	59	3.0	0.141	0.114	0.282	0.0321	0.146
14297	108	1.7	2.14	0.0910	1.07	0.0974	0.230
14401	142	2.7	2.30	0.122	1.15	0.140	0.070
06018	30	2.7	0.00510	0.184	0.0306	0.00563	0.548
06060	57	3.0	0.140	0.0696	0.279	0.0194	0.214
			25. Barley				
14305-2	110	1.7	1.08	0.00720	32.3	0.233	0.152
14306	110	1.7	1.68	0.00697	50.3	0.351	0.113
14395-2	143	2.7	1.19	0.0104	35.7	0.372	0.176
14396	143	2.7	1.84	0.00934	55.3	0.517	0.257

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p [a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			25. Barley (continued)				
06124-2	85	2.4	0.678	0.00663	19.6	0.130	0.078
06126	85	2.4	1.50	0.00806	43.4	0.350	0.086
06132-2	86	2.2	0.595	0.00588	17.2	0.101	0.078
06143	86	2.2	1.12	0.0162	32.4	0.524	0.086
06180-2	87	1.8	0.666	0.00285	19.3	0.0550	-
06222-2	109	1.4	0.923	0.0104	26.8	0.278	0.079
06225	109	1.4	1.58	0.0104	45.8	0.474	0.081
06277-2	112	1.5	0.920	0.00462	26.7	0.123	-
06277	112	1.5	1.92	0.00635	55.6	0.353	-
			26. Oats				
14303-2	110	1.7	0.539	0.00378	16.2	0.0612	0.025
14304	110	1.7	1.36	0.0116	40.8	0.472	0.077
14393-2	143	2.7	0.842	0.00947	22.7	0.213	0.017
14394	143	2.7	2.18	0.00798	58.8	0.469	0.046
14521-2	176	3.9	1.51	0.00405	40.7	0.165	0.0075
14544-2	178	3.7	1.51	0.00418	31.7	0.132	0.0075
06123-2	85	2.4	0.668	0.00354	20.7	0.0733	0.013
06125	85	2.4	2.50	0.0100	77.7	0.777	0.044
06131-2	86	2.2	0.615	0.00417	19.0	0.0795	0.013
06142	86	2.2	1.97	0.0156	61.0	0.950	0.044

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{V}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
			26. Oats (continued)				
06179-2	87	1.8	0.451	0.00345	14.0	0.0483	0.013
06221-2	109	1.4	0.603	0.0138	13.3	0.183	0.015
06227	109	1.4	1.89	0.0101	41.6	0.418	0.062
06273-2	112	1.5	0.515	0.00762	11.3	0.0864	-
06273	112	1.5	1.77	0.00914	38.9	0.356	-
06337-2	174	3.3	1.13	0.00739	24.8	0.184	0.010
			27. Rye				
14307-2	110	1.7	0.212	0.0276	-	-	0.044
14397	143	2.7	1.38	0.0269	-	-	0.012
14397-2	143	2.7	0.314	0.0591	-	-	0.060
14522-2	176	3.9	0.282	0.0266	-	-	0.030
14545-2	178	3.7	0.194	0.0374	-	-	0.030
14568-2	181	3.9	0.265	0.0244	-	-	0.030
14569	181	3.9	1.32	0.00701	-	-	0.014
14639-2	202	7.5	0.304	0.0230	-	-	0.038
14639	202	7.5	1.48	0.0331	-	-	0.012
06128	85	2.4	0.813	0.0523	-	-	0.041
06133-2	86	2.2	0.211	0.0385	-	-	0.043
06182-2	87	1.8	0.254	0.0267	-	-	-
06223-2	109	1.4	0.115	0.0320	-	-	0.102
06224	109	1.1	0.602	0.0124	-	-	0.042

a Gm/plant part for other than whole plant samples

Table 4 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	I_L	C^o_{PNR}
			27. Rye (continued)				
06279	112	1.5	1.32	0.0137	-	-	0.037
06279-2	112	1.5	0.183	0.0469	-	-	0.102
06336-2	174	3.3	0.265	0.0723	-	-	0.044
06351-2	179	3.8	0.158	0.0219	-	-	0.044
06352	179	3.8	0.944	0.00661	-	-	0.013
06393-2	201	3.0	0.246	0.0431	-	-	0.042
06394	201	3.0	0.986	0.0204	-	-	0.012
06428-2	203	3.8	0.220	0.0656	-	-	0.042
06447-2	204	3.1	0.303	0.0565	-	-	0.062
06448	204	3.1	1.08	0.0438	-	-	0.015
06591-2	236	2.8	0.440	0.0171	-	-	-
			28. Wheat				
14301-2	110	1.7	0.232	0.00869	6.96	0.0605	0.127
14302	110	1.7	0.675	0.00996	20.3	0.202	0.101
14338-2	114	1.5	0.329	0.0128	9.88	0.126	0.127
14391-2	143	2.7	0.340	0.00895	12.6	0.113	0.113
14392	143	2.7	0.693	0.0113	25.6	0.290	0.101
14520-2	176	3.9	0.643	0.00672	23.9	0.161	0.049
14543-2	178	3.7	0.752	0.00449	27.8	0.125	0.049
14765	65	5.6	0.814	0.0104	20.0	0.208	0.0047
14766-2	65	5.6	0.229	0.00617	5.64	0.0348	0.0087

a Gm/plant part for other than whole plant samples

Table 4 (concluded)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}
28. Wheat (continued)							
06122-2	85	2.4	0.210	0.00534	5.68	0.0303	0.058
06127	85	2.4	0.942	0.0131	25.4	0.332	0.038
06130-2	86	2.2	0.198	0.00629	5.36	0.0337	0.058
06141	86	2.2	0.888	0.0146	24.0	0.350	0.038
06178-2	8-	1.8	0.180	0.00838	4.87	0.0408	-
06220-2	109	1.4	0.438	0.0107	11.8	0.126	0.080
06226	109	1.4	1.10	0.0112	29.6	0.332	0.086
06275-2	112	1.5	0.372	0.00742	10.0	0.0745	-
06275	112	1.5	1.27	0.00659	34.4	0.226	-
06338-2	174	3.3	0.682	0.0134	23.1	0.311	0.055
06611	60	3.4	0.518	0.00903	11.9	0.107	0.056

a Gm/plant part for other than whole plant samples

Table 5

FOLIAR CONTAMINATION DATA FOR SECONDARY SAMPLES OF PLANT FOLIAGE

Sample Number	Age (days)	v_w (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				1. Bean				
01286-1		2.3		0.0791			0.059	damp, dry
01393-1		2.2		0.0433			0.034	damp, dry
01536-1		2.7		0.0384			0.062	dry
01539-1		1.7		0.0108			0.062	dry
13089-1		[illegible].3		0.0300			0.035	damp, dry
13090-1		3.3		0.0423			0.063	damp, dry
13151-1		3.0		0.13[illegible]			0.021	damp
13155-2		3.0		0.00330			0.0017	damp
13209-1				0.0972			0.037	damp
13214-1				0.0691			0.037	damp
13215-2				0.0160			0.039	damp
13255-2		4.8		0.00858			0.0017	damp
13261-1		4.8		0.0991			0.040	damp
13263-1		4.8		0.00552			0.040	damp
13266-1		4.8		0.0408			0.040	damp
13325-2				0.00302			0.012	damp
13327-1				0.0345			0.033	damp
13330-1				0.0261			0.033	damp
22044-1				0.140			0.046	damp, dry
22066-1				0.0397			0.036	dry

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p [a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				1. Bean (continued)				
24118-1		5.9		0.0102			0.030	dry
24174-1		4.3		0.0352			0.069	dry, damp
14030-1	30	8.5	0.0678	0.103	1.63	0.168	0.064	damp
14212	86	5.5	1.692	0.00850	5.08	0.043	0.0098	damp
14615	22	11.4	0.224	0.0025	0.672	0.002	0.030	dry
14667	29	5.0	0.327	0.0492	0.981	0.048	0.030	damp
14709	92	6.5	1.755	0.0347	5.26	0.183	0.016	damp
14710	60	6.5	1.014	0.0378	3.04	0.115	0.036	damp
14724	61	6.3	1.232	0.0346	3.70	0.128	0.036	damp
14729	94	7.8	3.078	0.0128	9.23	0.118	0.016	dry
14730	62	7.8	0.874	0.0168	2.62	0.044	0.036	dry
06375	24	3.0	0.173	0.0789	0.519	0.041	0.038	damp
06376	55	3.0	1.604	0.0261	4.81	0.126	0.026	damp
06467	29	4.1	0.359	0.0609	1.08	0.066	0.030	damp
06582	12	3.3	0.0708	0.0586	0.212	0.012	0.034	dry, damp
06584	59	3.3	0.420	0.0554	1.26	0.070	0.036	dry, damp
06645	15	3.6	0.126	0.0643	0.378	0.024	0.046	damp
06646	62	3.6	0.433	0.124	1.30	0.161	0.032	damp
				2. Beet				
01397-1		2.2		0.00974			0.042	dry

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				2. Beet (continued)				
13143-1		3.0		0.128			0.068	damp
13213-1				0.168			0.065	damp
13220-1				0.0511			0.085	damp
13257-1		4.8		0.0740			0.037	dry
14618	136	11.4	2.599	0.0116	2.599	0.030	0.0068	damp, dry
14663	142	5.0	3.232	0.0784	3.232	0.253	0.0083	damp
14715	174	6.5	5.667	0.0291	5.667	0.165	0.019	damp
14733	176	7.8	12.392	0.00609	12.392	0.075	0.011	damp
24122-1		5.9		0.00493			0.037	dry
				3. Bougainvillea				
01032-1				0.0284			0.012	damp, dry
01058-1				0.0698			0.012	damp, dry
01059-1				0.0472			0.012	damp, dry
01077-1				0.0256			0.021	damp, dry
01091-1				0.0203			0.021	dry, damp
01100-1				0.00372			0.012	dry, damp
01110-1				0.00626			0.012	damp
01128-1				0.0184			0.016	damp
01151-1		2.5		0.0640			0.058	damp
01158-1				0.0112			0.051	damp
01185-1		2.4		0.0408			0.048	damp
01201-1		2.4		0.0655			0.028	damp

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				4. Cabbage				
01287-1		2.3		0.0124			0.020	dry, damp
01360-1		2.4		0.0138			0.029	damp
13153		3.0	47.6	0.0150			0.0036	damp
13221			24.4	0.0168			0.0052	damp
14032	30	8.5	0.0521	0.116	0.0260	0.003	0.064	damp, dry
14215	86	5.5	19.88	0.0143	9.94	0.142	0.0073	damp
14721	60	6.5	1.581	0.0203	0.790	0.016	0.013	damp
14726	61	6.3	2.092	0.0311	1.05	0.033	0.013	damp
14732	62	7.8	3.361	0.0183	1.68	0.031	0.013	semidamp
06643	62	3.6	0.0430	0.158	0.0215	0.003	0.076	semidamp
22042-1				0.0398			0.020	damp
22064-1				0.0491			0.020	dry
24066-1				0.0357			0.032	damp
				5. Camellia				
01471-1		1.6		0.0137			0.0074	dry, damp
01563-1		2.8		0.0131			0.0066	dry
				6. Carrot				
01288-1		2.3		0.0281			0.065	dry, damp

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				6. Carrot (continued)				
01395-1		2.2		0.0307			0.022	damp, dry
13097-1				0.0211			0.050	damp
13093-1		3.3		0.0158			0.050	dry
22065-1				0.0978			0.013	dry
24064-1		5.1		0.0843			0.031	damp
24121-1		5.9		0.0242			0.031	dry
24163-1		6.7		0.0135			0.021	dry
24177-1		4.3		0.0159			0.021	dry
14619	136	11.4	0.386	0.00148	0.772	0.001	0.022	damp, dry
14662	142	5.0	0.921	0.0416	1.84	0.077	0.022	semidamp
14714	174	6.5	0.945	0.0126	1.89	0.024	0.019	damp
06465	114	4.1	0.184	0.229	0.368	0.084	0.022	damp
06578	144	3.3	0.312	0.0776	0.624	0.048	0.028	damp
06642	147	3.6	0.768	0.0991	1.54	0.153	0.027	semidamp
				7. Corn				
24019-1				0.0290			0.0093	damp
24040-1				0.0419			0.029	damp, dry
24071-1		5.1		0.0382			0.018	damp
24123-1		5.9		0.0135			0.018	dry
24170-1		6.7		0.0376			0.022	dry
24178-1		4.3		0.0223			0.022	dry

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
7. Corn (continued)								
14031	30	8.5	0.302	0.120	0.201	0.024	0.28	damp, dry
14213	86	5.5	8.16	0.0171	5.44	0.093	0.043	damp
14214	86	5.5	3.76	0.0238	2.51	0.060	0.043	damp
14621	59	11.4	0.677	0.0500	0.451	0.023	0.070	damp, dry
14656	65	5.0	3.34	0.0739	2.23	0.165	0.070	semidamp
14657	28	5.0	0.0859	0.136	0.0573	0.008	0.060	semidamp
14717	60	6.5	4.63	0.0412	3.09	0.127	0.044	damp
14736	62	7.8	5.94	0.0163	3.96	0.065	0.044	semidamp
06373	60	3.0	1.65	0.0592	1.10	0.065	0.085	damp, dry
06462	65	4.1	4.42	0.201	2.95	0.593	0.070	damp
06638-1,4	124	3.6	-	0.0295	16.69	0.492	0.012	semidamp
06638-3	124	3.6	41.34	0.0177	27.56	0.488	0.0062	semidamp
06638	124	3.6	66.38	0.0221	44.26	0.978	0.0082	semidamp
06575-1	96	3.3	0.901	0.0604	4.21	0.254	0.012	damp
06575-3,4	96	3.3	1.15	0.0581	0.767	0.045	0.015	damp
06575	96	3.3	7.46	0.0601	4.97	0.299	0.012	damp
06576	96	3.3	5.19	0.0504	3.46	0.174	0.047	damp
06639	99	3.6	25.27	0.0185	16.85	0.312	0.059	semidamp
8. Cypress (Italian)								
01410-1,3		2.3		0.00359			0.010	dry
01532-1,3		2.7		0.00428			0.010	dry

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				9. Gardenia				
01528-1		2.7		0.0260			0.010	dry
				10. Geranium				
01062-1				0.129			0.010	damp, dry
01078-1				0.0924			0.010	damp, dry
01093-1				0.0732			0.010	damp, dry
01101-1				0.0446			0.0090	damp, dry
01108-1				0.0388			0.043	damp, dry
01130-1				0.0809			0.020	damp, dry
01153-1		2.5		0.155			0.037	damp
01203-1		2.4		0.167			0.032	damp
01159-1				0.126			0.078	damp, dry
01409-1		2.3		0.0603			0.059	dry
01473-1		1.6		0.146			0.059	damp
01531-1		2.7		0.116			0.076	dry
				11. Grass (Bermuda Type)				
01022-1				0.0404			0.010	dry, damp
01024-1				0.0834			0.010	damp, dry
01046-1				0.0446			0.026	dry, damp

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
11. Grass (Bermuda Type) (continued)								
01050-1				0.0481			0.026	dry, damp
01050-1				0.0809			0.026	dry, damp
01069-1				0.0418			0.026	dry, damp
12. Grass (Quicuyo Pasture)								
13022-1				0.0998			0.020	damp
13023-1				0.0561			0.020	damp
13044-1				0.113			0.024	damp, dry
13061-1		4.9		0.134			0.098	damp, dry
13154-1		3.0		0.150			0.053	damp
13248-1				0.0723			0.028	dry
13269-1		4.8		0.148			0.028	damp
13. Grass (Barley)								
14720	80	6.5	0.413	0.0183	6.20	0.113	0.024	damp
06468	28	4.1	0.0783	0.0384	3.92	0.151	0.030	damp
06651	62	3.6	0.439	0.0364	6.58	0.240	0.021	semidamp
14. Grass (Oats)								
14023	20	11.4	0.0218	0.0706	1.74	0.123	0.031	damp, dry

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	n_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				14. Grass (Oats) (continued)				
14668	26	5.0	0.0421	0.0316	3.37	0.106	0.031	semidamp
14718	58	6.5	0.274	0.00764	13.7	0.105	0.047	semidamp
06650	62	3.6	0.300	0.0334	15.0	0.501	0.031	semidamp
				15. Grass (Wheat)				
14177	63	4.0	0.414	0.0119	46.0	0.547	0.024	damp
14178	63	4.0	0.320	0.00806	35.5	0.286	0.024	damp
14719	59	6.5	0.332	0.0214	7.84	0.168	0.0089	damp
				16. Lettuce				
01394-1		2.2		0.0824			0.113	damp
13091-1		3.3		0.0781			0.064	damp
13099-1				0.110			0.064	damp
13144-1		3.0		0.0844			0.052	damp
13145-1		3.0		0.0980			0.052	damp
13174-1				0.0783			0.052	dry, damp
13175-1				0.0520			0.052	dry, damp
13176-1				0.0447			0.052	dry, damp
13259-1		4.8		0.0670			0.080	damp, dry

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				16. Lettuce (continued)				
13331-1				0.0144			0.080	
24070-1		5.1		0.188			0.115	damp
14620	136	11.4	1.142	0.208	1.142	0.238	0.058	damp, dry
14660	142	5.0	8.92	0.0479	8.92	0.427	-	semidamp
14661	142	5.0	3.59	0.106	3.59	0.381	-	semidamp
14716	174	6.5	12.29	0.0964	7.37	0.710	0.058	damp
14735	176	7.8	14.67	0.0375	8.80	0.330	0.058	semidamp
				17. Onion				
24120-1		5.9		0.0164			0.033	dry
24161-1		6.7		0.00389			0.010	dry
24176-1		4.3		0.00913			0.010	dry
14617	200	11.4	1.61	0.00626	3.22	0.020	0.0062	damp, dry
14664	206	5.0	2.18	0.00434	4.36	0.019	0.0062	semidamp
14713	238	6.5	3.30	0.00244	6.60	0.016	0.0048	damp
14727	239	6.3	4.57	0.00148	9.14	0.014	0.0048	damp
14734	240	10.8	1.60	0.00644	3.20	0.021	-	semidamp
14734	240	9.4	1.60	0.00403	3.20	0.013	-	semidamp
14734	240	7.8	1.60	0.00318	3.20	0.010	0.0048	semidamp
				18. Pea				
14622	54	11.4	0.760	0.0174	1.14	0.020	0.011	damp, dry

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				18. Pea (continued)				
14655	60	5.0	1.68	0.00258	2.52	0.006	0.011	semidamp
14658	28	5.0	0.283	0.0432	0.424	0.018	0.013	semidamp
06372	55	3.0	0.712	0.0662	1.07	0.070	0.011	damp, dry
06461	60	4.1	1.44	0.0309	2.16	0.067	0.011	damp
06463	28	4.1	0.295	0.125	0.442	0.055	0.013	damp
06574	59	3.3	5.92	0.0140	8.88	0.124	0.0094	damp
06586-2	91	3.3	0.439	0.00263	4.94	0.013	0.0017	protected, damp
06587-2	91	3.3	0.450	0.00491	5.06	0.025	0.0017	exposed, damp
06640	62	3.6	6.35	0.0273	9.52	0.260	0.012	semidamp
				19. Pepper				
14616	136	11.4	0.166	0.0188	0.249	0.005	0.016	damp, dry
14665	142	5.0	0.601	0.0193	0.902	0.017	0.016	semidamp
14712	174	6.5	0.771	0.0143	1.16	0.017	0.034	damp
14725	175	6.3	1.262	0.0175	1.89	0.033	0.034	damp
14731	176	9.4	0.880	0.00342	1.32	0.004	-	semidamp
14731	176	7.8	0.880	0.0107	1.32	0.014	0.034	semidamp
				20. Poppy				
24032-1				0.571			0.028	damp
24041-1				0.283			0.011	dry
24057-1				0.472			0.028	dry

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p^a (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				21. Potato				
01285-1		2.3		0.110			0.032	damp, dry
01396-1		2.2		0.0351			0.032	dry, damp
01521-1		2.7		0.0612			0.020	dry
01537-1		2.7		0.0509			0.020	dry
01540-1		1.7		0.0603			0.044	dry
01541-1		1.7		0.0988			0.044	dry
13088-1		3.3		0.0469			0.038	damp
13092-1		3.3		0.0690			0.038	damp
13096-1				0.0500			0.038	damp
13098-1				0.0744			0.038	damp
13147-1		3.0		0.209			0.053	damp
13148-1		3.0		0.110			0.053	damp
13150-1		3.0		0.107			0.053	damp
13210-1				0.0519			0.034	damp, dry
13212-1				0.108			0.034	damp, dry
13217-1				0.117			0.034	damp, dry
13218-1				0.227			0.034	damp, dry
13258-1		4.8		0.0914			0.067	damp
13260-1		4.8		0.0814			0.067	damp
13262-1		4.8		0.0462			0.067	damp
13264-1		4.8		0.0654			0.067	damp
13326-1				0.0228			0.032	dry, damp

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
21. Potato (continued)								
13329-1				0.0280			0.032	dry, damp
22045-1				0.108			0.010	damp, dry
22067-1				0.118			0.046	dry
24119-1		5.9		0.0412			0.063	dry
24160-1		6.7		0.0672			0.058	dry
24175-1		4.3		0.0279			0.058	dry
14659	60	5.0	1.129	0.118	0.564	0.067	0.037	semidamp
06374	55	3.0	3.813	0.126	1.91	0.241	0.037	damp, dry
06464	60	4.1	1.746	0.0150	0.873	0.013	0.037	semidamp
06577	91	3.3	7.657	0.0797	3.83	0.305	0.037	damp
06641	94	3.6	5.822	0.134	2.91	0.390	0.019	semidamp
22. Radish								
14614	54	11.4	0.283	0.0648	1.13	0.073	0.051	semidamp
14666	60	5.0	0.725	0.0515	2.90	0.149	0.051	semidamp
14711	92	6.5	2.13	0.0377	8.52	0.321	0.045	damp
06377	55	3.0	0.552	0.107	2.21	0.236	0.051	damp, dry
06466	60	4.1	0.583	0.124	2.33	0.289	0.051	damp
06581	91	3.3	0.600	0.109	2.40	0.261	0.045	damp
06644	94	3.6	1.64	0.0836	6.56	0.548	0.036	semidamp

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				23. Rose				
01025-1				0.0558			0.061	damp, dry
01026-1				0.105			0.061	damp, dry
01048-1				0.0346			0.061	damp, dry
01049-1				0.0295			0.061	damp, dry
01070-1				0.0115			0.050	damp, dry
01405-1		2.3		0.0221			0.012	dry
01469-1		1.6		0.0412			0.012	semidamp
01527-1		2.7		0.0267			0.012	dry
01561-1		2.8		0.0564			0.012	damp
13152-1		3.0		0.103			0.010	damp
				24. Squash (Zucchini)				
14029-1	30	8.5	0.200	0.0946	0.750	0.071	0.148	damp, dry
14156-2*	59	4.8	0.190	0.103	0.143	0.015	-	damp
14211-1	86	5.5	0.384	0.0308	0.959	0.030	0.033	damp
06647	62	3.6	0.538	0.200	0.404	0.081	0.034	semidamp
				25. Tomato				
13149-1		3.0		0.0993			0.030	damp
13219-1				0.0743			0.030	damp, dry

a Gm/plant part for other than whole plant samples

Table 5 (continued)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p[a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
25. Tomato (continued)								
13256-1		4.8		0.0519			0.096	dry
13265-1		4.8		0.0432			0.096	dry
13328-1				0.0154			0.048	dry, damp
13332-1				0.0242			0.048	dry, damp
24124-1		5.9		0.0496			0.215	dry
24171-1		6.7		0.0776			0.051	
24179-1		4.3		0.0671			0.400	
14033	30	8.5	0.0307	0.0574	0.184	0.011	0.257	dry, damp
26. Barley								
14205	87	5.5	1.41	0.00757	42.2	0.320	0.244	damp
14208-2	87	5.5	0.718	0.00634	21.5	0.137	0.245	damp
06169-2	86	2.4	0.590	0.00254	17.1	0.0434	0.078	damp
27. Oats								
14206	87	5.5	1.12	0.00612	34.5	0.205	0.033	damp
14207-2	87	5.5	0.329	0.00201	9.88	0.0199	0.0068	damp
06171-2	86	2.4	0.413	0.000883	12.8	0.0113	0.013	damp

a Gm/plant part for other than whole plant samples

Table 5 (concluded)

Sample Number	Age (days)	$\bar{v}_w$ (mi/hr)	m_p [a] (gm/plant)	a_L (sq ft/gm)	w_L (gm/sq ft)	F_L	C^o_{PNR}	Conditions
				28. Rye				
14669-2	207	5.0	0.322	0.0346	-	-	0.042	semidamp
14670	207	5.0	1.55	0.0206	-	-	0.012	semidamp
06378-2	200	3.0	0.230	0.0528	-	-	0.048	damp, dry
06379	200	3.0	1.21	0.0130	-	-	0.012	damp, dry
06469-2	205	4.1	0.315	0.0525	-	-	-	damp
06591-2	236	3.3	0.440	0.0154	-	-	0.021	damp
				29. Wheat				
14204	87	5.5	0.639	0.0164	19.2	0.315	0.040	damp
14210-2	87	5.5	0.178	0.00528	5.34	0.0282	0.084	damp
14737-2	61	7.8	0.181	0.00584	4.44	0.0259	0.0087	semidamp
06170-2	86	2.4	0.169	0.00300	4.55	0.0136	0.058	damp
06648	61	3.6	0.587	0.0151	13.4	0.204	0.010	semidamp
06649-2	61	3.6	0.192	0.0145	4.40	0.0636	0.014	semidamp

a Gm/plant part for other than whole plant samples

Table 6

FOLIAR CONTAMINATION DATA FOR PRIMARY SAMPLES OF LEAVES AND TWIGS FROM LARGE SHRUBS AND TREES TAKEN UNDER DRY CONDITIONS

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Sample Description
			1. Camphor		
06517-1	4.6	0.0806	0.0153	0.012	Protected
06517-1,3	4.6	0.0952	0.0114	0.012	Protected
06518-1	4.6	0.0721	0.0234	0.012	Exposed, NE side
06518-1,3	4.6	0.0810	0.0197	0.012	Exposed, NE side
06540-1	4.0	0.0527	0.0267	-	Protected
06540-1,3	4.0	0.0612	0.0232	-	Protected
06541-1	4.0	0.0666	0.0311	-	Exposed, NE side
06541-1,3	4.0	0.0767	0.0264	-	Exposed, NE side
			2. Cypress (Italian)		
01342-1,3			0.00287	0.010	
			3. Grapefruit		
16057s-1	3.0	0.625	0.0113	0.0057	
16066s-1	3.0	0.362	0.0288	0.0057	
16134s-1	3.0	0.206	0.0198	0.0057	
16155s-1	3.0	0.616	0.0155	0.0057	
16166s-1	3.0	0.247	0.0132	0.0057	
All Samples	3.0	0.334	0.0171	0.0057	

Table 6 (continued)

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Sample Description
			4. Juniper		
16033	3.0	-	0.00205	0.058	North side
16034	3.0	-	~0.0	0.058	East side
16035	3.0	-	0.00178	0.058	South side
16036	3.0	-	0.0192	0.058	West side
16037	3.0	-	0.00149	0.058	Top, center
			5. Laurel		
15038-1	3.9	0.0973	0.0308	0.026	E side, bottom
15039-1	3.9	0.104	0.0298	0.026	S side, bottom
15040-1	3.9	0.0924	0.0123	0.026	W side, bottom
15041-1	3.9	0.0918	0.0123	0.026	N side, bottom
15042-1	3.9	0.0924	0.00272	0.026	center, bottom
15043-1	3.9	0.0843	0.0324	0.026	N side, top
15044-1	3.9	0.0867	0.0689	0.026	S side, top
15045-1	3.9	0.0756	0.0299	0.026	W side, top
15046-1	3.9	0.0923	0.0787	0.026	E side, top
15047-1	3.9	0.0997	0.0734	0.026	center, top
15048-1	3.9	0.0937	0.0334	0.026	E side, center
15049-1	3.9	0.0952	0.0378	0.026	W side, center
15049s-1	3.9	0.0916	0.0383	0.026	average, per leaf

Table 6 (concluded)

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Sample Description
			6. Orange		
01116-1			0.0104	0.017	
01344-1			0.0728	0.0063	
			7. Pine-2		
16006-1,3	2.0	0.0766	0.00119	0.0072	S-SE side
16007-1,3	2.0	0.0779	0.00328	0.0072	S side
16008-1,3	2.0	0.0734	0.00573	0.0072	SW side
16009-1,3	2.0	0.0731	0.00392	0.0072	S-SW side
16010-1,3	2.0	0.0804	0.0308	0.0072	W side
16011-1,3	2.0	0.0753	0.0247	0.0072	N-NW side
16012-1,3	2.0	0.0678	0.00869	0.0072	N side
16013-1,3	2.0	0.0817	0.00189	0.0072	NE side
16014-1,3	2.0	0.0847	0.00189	0.0072	E side
16014s-1,3	2.0	0.0763	0.0116	0.0072	average, per twig

Table 7

FOLIAR CONTAMINATION DATA FOR PRIMARY SAMPLES OF LEAVES AND TWIGS FROM LARGE SHRUBS AND TREES TAKEN UNDER DAMP CONDITIONS

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Sample Description
			1. Avocado		
14524-1	3.9	0.154	0.0212	0.0058	Exposed, midheight
14546-1	3.7	0.108	0.0221	-	Exposed, midheight
14570-1	3.9	0.235	0.0169	-	Exposed, midheight
14641-1,3	7.5	0.2[illegible]5	0.0294	0.012	Exposed, midheight
			2. Camphor		
06339-1	3.3	0.0348	0.0553	0.010	Exposed, top leaves
06353-1	3.8	0.0525	0.0704	-	Exposed, top leaves
06395-1,3	[illegible]	0.0821	0.0256	-	Exposed, NE side
06396-1,3	3.0	0.0756	0.0212	-	Exposed, SW side
06397-1,3	3.0	0.0846	0.00874	-	Protected, low
06429-1,3	3.8	0.120	0.0341	0.018	Protected, low
06430-1,3	3.8	0.0798	0.0971	0.030	Exposed, NE side
06449-1,3	3.1	0.0681	0.0368	0.012	Exposed, NE side
[illegible]50-1,3	3.1	0.0780	0.0159	0.012	Protected, low
[illegible] 2-1	2.8	0.0912	0.0131	-	Protected
06592-1,3	2.8	0.100	0.0121	-	Protected
06593-1	2.8	0.0626	0.0174	-	Exposed, NE side
06593-1,3	2.8	0.0744	0.0130	-	Exposed, NE side

Table 7 (continued)

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Sample Description
			3. Cestrum Acuminatum (Shrub)		
13008-1	2.5		0.0855	0.025	
13053-1	3.8		0.0792	0.071	
			4. Cypress (Italian)		
01323-1,3	1.0		0.0148	0.010	
01511-1,3	1.0		0.0365	0.024	
			5. Laurel		
15027-1	2.0	0.123	0.0292	-	E side, bottom
15028-1	2.0	0.116	0.0106	-	N side, bottom
15029-1	2.0	0.165	0.00109	-	W side, bottom
15030-1	2.0	0.108	0.00681	-	S side, bottom
15031-1	2.0	0.0839	0.0558	-	N side, top
15032-1	2.0	0.0628	0.0412	-	E side, top
15033-1	2.0	0.110	0.0174	-	W side, top
15034-1	2.0	0.113	0.0381	-	S side, top
15035-1	2.0	0.0934	0.0298	-	center, top
15035a-1	2.0	0.100	0.0269	-	average, per leaf
15052-1	2.0	0.130	0.0291	-	N side, bottom
15052-1	2.5	0.130	0.0211	0.026	N side, bottom
15053-1	2.0	0.106	0.0140	-	S side, bottom

Table 7 (continued)

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Sample Description
		5. Laurel (continued)			
15053-1	2.5	0.106	0.0216	0.026	S side, bottom
15054-1	2.0	0.0855	0.00653	-	E side, bottom
15054-1	2.5	0.0855	0.0181	0.026	E side, bottom
15055-1	2.0	0.100	0.0336	-	W side, bottom
15055-1	2.5	0.100	0.0234	0.026	W side, bottom
15056-1	2.0	0.104	0.00808	-	center, bottom
15056-1	2.5	0.104	0.00551	0.026	center, bottom
15057-1	2.0	0.101	0.0564	-	N side, top
15057-1	2.5	0.101	0.0449	0.026	N side, top
15058-1	2.0	0.0970	0.0390	-	S side, top
15058-1	2.5	0.0970	0.0533	0.026	S side, top
15059-1	2.0	0.0884	0.0118	-	E side, top
15059-1	2.5	0.0884	0.0438	0.026	E side, top
15060-1	2.0	0.0712	0.0931	-	W side, top
15060-1	2.5	0.0712	0.0629	0.026	W side, top
15061-1	2.0	0.0949	0.0391	-	center, top
15061-1	2.5	0.0949	0.0555	0.026	center, top
15061s-1	2.0	0.0964	0.0341	-	average, per leaf
15061s-1	2.5	0.0964	0.0361	0.026	average, per leaf
15062-1	2.5	0.132	0.149	0.026	NW sector, center
15063-1	2.5	0.128	0.0286	0.026	NW sector, center, (V)[a]

a (V) designates leaves that were hanging vertically

Table 7 (continued)

Sample Number	$\bar{V}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Sample Description
		5. Laurel (continued)			
15064-1	2.5	0.126	0.0972	0.026	NW sector, center
15065-1	2.5	0.130	0.0188	0.026	NW sector, center, (V)[a]
15066-1	2.5	0.130	0.0611	0.026	NW sector, center
15067-1	2.5	0.137	0.00898	0.026	NW sector, center, (V)[a]
15068-1	2.5	0.107	0.0960	0.026	NW sector, center
15068a-1	2.5	0.124	0.101	0.026	NW sector, center
15069-1	2.5	0.157	0.0626	0.026	SW sector, center
15070-1	2.5	0.129	0.0731	0.026	SW sector, center
15071-1	2.5	0.0887	0.0923	0.026	SW sector, center
15072-1	2.5	0.155	0.0836	0.026	SW sector, center
15073-1	2.5	0.115	0.0391	0.026	SW sector, center
15074-1	2.5	0.138	0.0329	0.026	SW sector, center
15075-1	2.5	0.132	0.0537	0.026	SW sector, center
15075a-1	2.5	0.131	0.0618	0.026	SW sector, center
15076-1	2.5	0.182	0.0389	0.026	SE sector, center
15077-1	2.5	0.0759	0.0141	0.026	SE sector, center
15078-1	2.5	0.0939	0.0487	0.026	SE sector, center
15079-1	2.5	0.187	0.0599	0.026	SE sector, center
15080-1	2.5	0.118	0.0756	0.026	SE sector, center
15081-1	2.5	0.120	0.0892	0.026	SE sector, center
15082-1	2.5	0.158	0.118	0.026	SE sector, center

a (V) designates leaves that were hanging vertically

Table 7 (continued)

Sample Number	$\bar{V}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Sample Description
			5. Laurel (continued)		
15082s-1	2.5	0.133	0.0769	0.026	SE sector, center
15083-1	2.5	0.181	0.111	0.026	NE sector, center
15084-1	2.5	0.140	0.0929	0.026	NE sector, center
15085-1	2.5	0.132	0.0855	0.026	NE sector, center
15086-1	2.5	0.102	0.0774	0.026	NE sector, center
15087-1	2.5	0.100	0.0412	0.026	NE sector, center
15088-1	2.5	0.114	0.0512	0.026	NE sector, center
15089-1	2.5	0.117	0.103	0.026	NE sector, center
15089s-1	2.5	0.127	0.0838	0.026	NE sector, center
15089s-1	2.5	0.130	0.0718	0.026	average, per leaf
			6. Orange		
01144-1	1.0		0.0701	0.019	
01181-1	2.4		0.0724	0.061	
01321-1	1.0		0.0391	0.0063	
			7. Pine-1		
13504-1,3	2.0	-	0.00166	0.0044	S side
13505-1,3	2.0	-	0.00056	0.0044	N side
13506-1,3	2.0	-	0.00347	0.0044	E side

Table 7 (concluded)

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Sample Description
		8. Sapium Jamaicense Swartz (Tree)			
13011-1	2.5		0.0347	0.0051	
13054-1	3.8		0.0254	0.020	
		9. Tree-1 (Laurel-Type Leaves)			
13009-1	2.5		0.0201	0.0023	
13010-1	2.5		0.0374	0.0023	
13055-1	3.8		0.0298	0.014	

Table 8

·LIAR CONTAMINATION DATA FOR SECONDARY SAMPLES OF LEAVES AND TWIGS FROM LARGE SHRUBS AND TREES

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Conditions
			1. Avocado		
14624-1,3	10.1	0.324	0.0207	0.012	Damp
			2. Camphor		
06381-1,3	3.0	0.0921	0.0502	-	Exposed, NE side, damp & dry
06382-1,3	3.0	0.126	0.0197	-	Exposed, SW side, damp & dry
06383-1,3	3.0	0.106	0.00929	-	Protected, low, damp & dry
06395-1,3	3.0	0.0821	0.0355	-	Exposed, NE side, damp & dry
06396-1,3	3.0	0.0756	0.0206	-	Exposed, SW side, damp & dry
06397-1,3	3.0	0.0846	0.00896	-	Protected, low, damp, dry
06592-1	3.3	0.0912	0.00906	-	Protected, damp
06592-1,3	3.3	0.100	0.00869	-	Protected, damp
06593-1	3.3	0.0626	0.0164	-	Exposed, NE side, damp
06593-1,3	3.3	0.0744	0.0133	-	Exposed, NE side, damp
			3. Cestrum Acuminatum (Shrub)		
13030-1		-	0.0129	0.017	Damp, dry
13031-1			0.0160	0.017	Damp, dry
13042-1			0.0142	0.050	Damp
13047-1			0.0245	0.050	Damp, dry
13064-1	4.5		0.00941	0.071	Dry

Table 8 (continued)

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Conditions
			4. Cypress (Italian)		
01034-1,3			0.000885	0.0087	Dry
01474-1,3	1.6		0.00525	0.024	Semidamp
			5. Grapefruit		
16289-3	3.4	0.170	0.00164	-	Dry
16289-1,3	3.4	0.819	0.00495	0.0045	Dry
16290-3	3.4	0.0592	0.00431	-	Dry
16290-1,3	3.4	0.437	0.00836	0.0049	Dry
16291-3	3.4	0.0419	0.00575	-	Dry
16291-1,3	3.4	0.235	0.00682	0.0047	Dry
16292-3	3.4	0.125	0.00452	-	Dry
16292-1,3	3.4	0.360	0.00678	0.0037	Dry
16292s-3	3.4	0.109	0.00287	-	Dry
16292s-1,3	3.4	0.529	0.00607	0.0045	Dry
			6. Laurel		
15017-1	3.5	0.122	0.00291	0.028	N side, bottom, semidamp
15018-1	3.5	0.136	0.00582	0.028	S side, bottom, semidamp
15019-1	3.5	0.118	0.00179	0.028	E side, bottom, semidamp
15020-1	3.5	0.181	0.00750	0.028	W side, bottom, semidamp
15021-1	3.5	0.154	0.00454	0.028	Center, bottom, semidamp
15022-1	3.5	0.125	0.00327	0.028	N side, top, semidamp
15023-1	3.5	0.113	0.00173	0.028	S side, top, semidamp
15024-1	3.5	0.192	0.00036	0.028	E side, top, semidamp

Table 8 (continued)

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Conditions
			6. Laurel (continued)		
15025-1	3.5	0.0830	0.0128	0.028	W side, top, semidamp
15026-1	3.5	0.124	0.00668	0.028	Center, top, semidamp
15026s-1	3.5	0.133	0.00434	0.028	Average, per leaf, semidamp
15098-1	2.5	0.0984	0.00515	0.022	N side, top, dry
15099-1	2.5	0.0946	0.0152	0.022	E side, top, dry
15100-1	2.5	992	0.0102	0.022	S side, top, dry
15101-1	2.5	0.0981	0.00487	0.022	W side, top, dry
15102-1	2.5	0.0977	0.0134	0.022	N side, center, dry
15103-1	2.5	0.0907	0.0499	0.022	E side, center, dry
15104-1	2.5	0.0956	0.0193	0.022	S side, center, dry
15105-1	2.5	0.106	0.0120	0.022	W side, center, dry
15106-1	2.5	0.101	0.0147	0.022	Center, bottom, dry
15106s-1	2.5	0.0980	0.0150	0.022	Average, per leaf
			7. Orange		
01035-1			0.000933	0.013	Dry
01079-1			0.000473	0.018	Dry
01126-1			0.00579	0.010	Damp
01149-1	2.4		0.0222	0.029	Damp
01157-1			0.0263	0.022	Damp
01199-1	2.4		0.0328	0.010	Damp
01408-1	2.3		0.00604	0.0038	Dry
01472-1	1.6		0.0269	0.0038	Semidamp
01530-1	2.7		0.0143	0.0038	Dry
01564-1	2.8		0.0156	0.0038	Damp & dry

Table 8 (continued)

Sample Number	$\bar{v}_W$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Conditions
			8. Pine-2		
16038-1,3	3.0	0.0736	0.000928	0.00086	N side, dry
16039-1,3	3.0	0.0763	0.00136	0.00086	E side, dry
16040-1,3	3.0	0.0817	0.0138	0.00086	S side, dry
16041-1,3	3.0	0.0790	0.00419	0.00086	W side, dry
16041s-1,3	3.0	0.0779	0.00517	0.00086	Average, per twig
16042-1,3	3.0	0.0730	0.00752	0.0018	N side, meristems, dry
16043-1,3	3.0	0.0761	0.00525	0.0018	E side, meristems, dry
16044-1,3	3.0	0.0753	0.0196	0.0018	S side, meristems, dry
16045-1,3	3.0	0.0748	0.00951	0.0018	W side, meristems, dry
16045s-1,3	3.0	0.0746	0.00927	0.0018	Average, per twig
			9. Sapium Jamaicense Swartz (Tree)		
13026-1			0.0187	0.0034	Damp, dry
13027-1			0.0229	0.0034	Damp, dry
13040-1			0.0332	0.014	Damp
13045-1			0.00277	0.014	Damp, dry
13062-1	4.9		0.0584	0.020	Dry
			10. Tree-1 (Laurel-Type Leaves)		
13028-1			0.00513	0.0084	Damp, dry
13029-1			0.00595	0.0084	Damp, dry
13041-1			0.0459	0.022	Damp
13046-1			0.0261	0.022	Damp, dry
13063-1	4.9		0.0601	0.014	Dry

Table 8 (concluded)

Sample Number	$\bar{v}_w$ (mi/hr)	m_L (gm/leaf)	a_L (sq ft/gm)	C^o_{PNR}	Conditions
11. Tree-24 (Broadleaf)					
24021-1	-	-	0.00193	0.012	Damp, dry
24026-1	-	-	0.0129	0.012	Damp, dry
24033-1	-	-	0.0413	0.048	Damp
24042-1	-	-	0.0186	0.048	Dry

Table 9

FOLIAR CONTAMINATION WEATHERING DATA FOR VEGETABLES, CEREAL GRAINS, FLOWERS, SMALL SHRUBS, AND VINES

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				1. Bean				
01238						0.11	0.399	Damp
01265-1						0.23	0.636	Damp
01286-1						0.01	0.795	Dry
01361-1						0.13	0.810	Damp
01368-1						0.13	0.737	Damp
01387-1			29.6	0.836	0.00608	0.14	0.616	Damp
01387-1						0.01	0.836	Damp
01393-1						0.01	~1.0	Damp
01422-1			39.8	0.226	0.0374	0.20	0.226	Damp, dry
01440-1			75.7	0.127	0.0274	0.20	0.127	Damp, dry
01440-1			35.8	0.561	0.0161			Damp
01568-1			6.85	0.171	0.257			Damp
13138-1			93.4	0.0606	0.0300	0.18	0.0606	Dry
13310-1						0.04	0.262	With rain
13311-1						0.04	0.456	With rain
13312-2						0.04	0.192	With rain
22055-1			37.9	0.759	0.00729	0.01	0.795	Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				1. Bean (continued)				
24069-1						0.09	0.675	Damp
24110-1			63.7	0.559	0.00915			Dry
24164-1			87.4	0.155	0.0213			Damp
14053	30	0.702	74.7			1.03	8.96	Dry
14079-1	31	0.109	37.6			1.11	4.74	Dry, bottom leaf
14080-1	31	0.0723	37.6			1.11	0.828	Dry, top leaf
14140	59	2.07	17.2	0.387	0.0552			Damp
14153	59	2.98	32.9	0.426	0.0259			Damp
14163	59	2.01	47.2			0.30	0.528	Damp
14317	17	0.165	11.3	0.679	0.0343			Damp
14322	17	0.136	17.6	0.187	0.0953			Damp
14412	50	1.07	5.1	0.759	0.0542			Damp
14424	50	0.894	12.2	0.638	0.0368			Damp
14604	21	0.239	66.8	0.0494	0.0450			Dry
14768	98	3.84	56.1	0.315	0.0206			Damp
14769	66	0.935	56.1	0.347	0.0189			Damp
14783-1	98	-	147.5	0.599	0.00347	0.07	0.599	Damp
14784	66	0.672	147.5	0.935	0.00045	0.07	0.935	Damp
06027	30	0.338	37.7	0.112	0.0580			Damp
06039-1	30	0.0517	50.7			0.15	0.0820	Damp, top leaf

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				1. Bean (continued)				
06040-1	30	0.0697	50.7			0.15	0.462	Damp, bottom leaf
06072	57	0.960	28.9	0.236	0.0500	0.07	0.236	Damp
06233	18	0.207	11.1	0.327	0.101			Damp
06244	18	0.145	27.7	0.303	0.0431	0.02	0.303	Damp
06399	25	0.176	26.0	0.435	0.0320			Damp
06400	56	1.27	26.0	0.514	0.0256			Damp
06456	28	0.240	25.1	0.141	0.0781			Damp
06551	11	0.085	26.3	0.576	0.0211			Dry
06552	39	0.501	26.3	0.726	0.0122			Dry
				2. Beet				
01362-1						0.13	0.436	Damp
01369-1						0.13	0.198	Damp
01391-1			29.6	0.790	0.00794	0.14	0.156	Damp
01391-1						0.01	0.790	Damp
01418-1			39.8	0.598	0.0129	0.20	0.598	Damp, dry
01437-1			75.7	0.298	0.0160	0.20	0.298	Damp, dry
01437-1			35.8	0.499	0.0194			Damp, dry
01520-1			21.7	0.181	0.0787			Dry
01520-1			38.7	0.249	0.0359			Dry

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				2. Beet (continued)				
01567-1			6.85	0.341	0.157			Damp
24068-1						0.09	0.794	Damp
24114-1			63.7	0.222	0.0236			Dry
24168-1			87.4	0.102	0.0261			Damp
24184-1			106.3	0.120	0.0200			Damp
14414	78	2.68	5.1	0.742	0.0583			Damp
14528	111	5.81	45.5	0.285	0.0276			Damp
14606	135	7.83	66.8	0.533	0.00941			Dry
14752	180	4.92	724.5	0.444	0.00112	0.03	0.444	Damp
14788	180	3.92	56.1	0.0627	0.0494			Damp
14788	180	3.92	147.5	0.568	0.00384	0.07	0.568	Damp
06154	22	0.163	32.4	0.119	0.0657			Damp
06231	45	0.892	11.1	0.411	0.0811			Damp
06242	45	0.592	27.7	0.241	0.0514	0.02	0.241	Damp
				3. Bougainvillia				
01185-1						0.03	0.630	Damp
01193-1			32.1	0.919	0.00265			Damp
01209-1						0.16	0.348	Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
4. Cabbage								
01240-1						0.11	1.62	Damp
01267-1						0.23	1.34	Damp
01287-1						0.01	~1.0	Dry
01360-1						0.13	0.471	Damp
01367-1						0.13	0.519	Damp
01386-1			29.6	0.651	0.0135	0.14	0.338	Damp
01386-1						0.01	0.651	Damp
01420-1			39.8	0.521	0.0164	0.20	0.521	Damp,dry
01439-1			75.7	0.409	0.0118	0.20	0.409	Damp,dry
01439-1			35.8	0.784	0.00682			Damp
22051-1			37.9	0.147	0.0506	0.01	0.759	Damp
24066-1						0.09	1.31	Damp
14141	59	0.797	17.2	0.579	0.0317			Damp
14154	59	1.13	32.9	0.224	0.0455			Damp
14164	59	0.652	47.2			0.30	0.129	Damp
14329	109	54.8	23.0	0.247	0.0608	0.07	0.247	Damp
14742	65	4.40	724.5	0.253	0.00190	0.03	0.253	Damp
14770	66	3.53	56.1	0.143	0.0347			Damp
14785	66	3.42	147.5	0.179	0.0117	0.07	0.179	Damp
06155	85	6.95	32.4	0.386	0.0294			Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_s	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				4. Cabbage (continued)				
06246	108	21.9	27.7	0.857	0.00557	0.02	0.857	Damp
06549	58	0.053	26.3	0.758	0.0105			Dry
				5. Carrot				
01241-1						0.11	0.254	Damp
01266-1						0.23	1.06	Damp
01288-1						0.01	1.34	Dry
01363-1						0.13	0.757	Damp
01370-1						0.13	0.623	Damp
01380-1			29.6	0.568	0.0191	0.14	0.354	Damp
01385-1						0.01	0.568	Damp
01421-1			39.8	0.495	0.0176	0.20	0.495	Damp
01441-1			75.7	0.260	0.0175	0.20	0.260	Damp, dry
01441-1			35.8	0.525	0.0130			Damp
24113-1			63.7	0.901	0.00163			Dry
24167-1			87.4	0.0908	0.0275			Damp
24183-1			106.3	0.272	0.0122			Damp
14773	180	2.36	56.1	0.190	0.0296			Damp
14795	180	1.71	147.5	1.39	-	0.07	1.39	Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
			5. Carrot (continued					
06152	85	0.072	32.4	0.306	0.0365			Damp
06230	108	0.597	11.1	0.795	0.0206			Damp
06241	108	0.262	27.7	0.288	0.0450	0.02	0.288	Damp
06454	113	0.264	25.1	0.168	0.0711			Damp
06550	143	0.415	26.3	0.360	0.0389			Damp
				6. Corn				
24054-1			88.8	0.274	0.0146			Damp, dry
24071-1						0.09	0.856	Damp
24115-1			63.7	0.423	0.0135			Dry
24172-1			87.4	0.158	0.0211			Damp
24185-1			106.3	0.296	0.0115			Damp
14052	30	0.220	74.7			1.03	4.09	Damp, dry
14142	59	0.363	17.2	0.219	0.0883			Damp
14155	59	0.190	32.9	0.188	0.0508			Damp
14165	59	0.384	47.2			0.30	0.193	Damp
14323	109	6.19	17.6	0.335	0.0622			Damp
14330	109	15.0	23.0	0.168	0.0776	0.07	0.168	Damp
14531	34	0.145	45.5	0.206	0.0347			Damp
14739	102	13.3	724.5	0.264	0.00184	0.03	0.264	Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	γ_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				6. Corn (continued)				
14776	66	8.33	56.1	0.516	0.0118			Damp
14790	66	4.92	147.5	0.627	0.00317	0.07	0.627	Damp
06030	30	0.176	37.7	0.167	0.0475			Damp
06042	30	0.094	50.7			0.15	0.0783	Damp
06043	30	-	50.7			0.15	1.04	Damp, centers
06071	57	1.72	28.9	0.374	0.0340	0.07	0.374	Damp
06078	57	1.14	37.7			0.25	0.874	Damp
06162	85	6.33	32.4	0.387	0.0293			Damp
06406	61	0.881	26.0	0.574	0.0213			Damp
06545	95	11.6	26.3	1.54	-			Dry
06546	95	4.85	26.3	1.00	-			Dry
06626-1,4	123	-	13.6	0.448	0.0591			Damp
06626-3	123	-	13.6	6.38	-			Damp
06626	123	69.6	13.6	0.668	0.0296			Damp
				7. Cypress (Italian)				
01416-1,3						0.20	0.908	Dry
01566-1,3			28.6	0.451	0.0279			Dry

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	ψ_w	k_w (mi^{-1})	R (inches)	ψ_{wr}	Initial Conditions
				8. Geranium				
01186-1						0.03	0.653	Damp
01196-1			32.1	1.13	-	0.03	0.739	Damp
01203-1						0.01	1.18	Damp
01211-1						0.16	0.399	Damp
01226-1						1.48	0.0253	Damp, dry
01415-1						0.20	0.380	Dry
01565-1			28.6	0.322	0.0396			Dry
				9. Grass (Quicuyo Pasture)				
13139-1			93.4	0.249	0.0149	0.18	0.249	Dry
13216-1						0.10	0.0593	With rain
				10. Grass (Barley)				
14143	60	0.652	17.2	0.189	0.0969			Damp
14150	60	0.584	32.9	0.0748	0.0788			Damp
14158	60	0.521	47.2			0.30	0.0283	Damp
06032	31	0.100	37.7	0.207	0.0418			Damp
06035	31	0.102	50.7			0.15	0.0481	Damp
06067	58	0.508	28.9	0.141	0.0678	0.07	0.141	Damp
06074	58	0.504	37.7			0.25	0.180	Damp
06458	27	0.0637	25.1	0.147	0.0755			Damp
06555	58	0.302	26.3	0.197	0.0618			Dry

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				11. Grass (Oats)				
14051	31	-	74.7			1.03	0.00853	Damp
14144	60	0.522	17.2	0.257	0.0790			Damp
14149	60	0.637	32.9	0.138	0.0620			Damp
14159	60	0.489	47.2			0.30	0.0318	Damp
14183	64	0.487	11.5	0.116	0.187			Damp
14778	64	0.423	56.1	0.0563	0.0513			Damp
14792	64	0.470	147.5	0.0312	0.0235	0.07	0.0312	Damp
06031	31	0.107	37.7	0.0621	0.0737			Damp
06034	31	0.124	50.7			0.15	0.0280	Damp
06068	58	0.626	28.9	0.265	0.460	0.07	0.265	Damp
06075	58	0.692	37.7			0.25	0.0368	Damp
06554	58	0.301	26.3	0.102	0.0868			Dry
				12. Grass (Rye)				
14049	31	-	74.7			1.03	0.0229	Damp
14145	60	0.111	17.2	0.755	0.0163			Damp
14151	60	0.0921	32.9	0.455	0.0239			Damp
14160	60	0.134	47.2			0.30	0.196	Damp
06034	31	0.0494	37.7	0.364	0.0268			Damp
06037	31	0.0493	50.7			0.15	0.0460	Damp
06059	58	0.176	28.9	0.268	0.0456	0.07	0.268	Damp
06076	58	0.272	37.7			0.25	0.0516	Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
13. Grass (Wheat)								
14050	31	-	74.7			1.03	0.0304	Damp
14146	60	0.354	17.2	0.171	0.1027			Damp
14148	60	0.309	32.9	0.0777	0.0777			Damp
14161	60	0.375	47.2			0.30	0.0256	Damp
14179[b]	63	0.318	3.1	0.755	0.0906			Damp
14180[c]	63	0.306	3.1	0.883	0.0401			Damp
14181[b]	63	0.304	6.9	0.296	0.1764			Damp
14182[c]	63	0.341	6.9	0.720	0.0477			Damp
14184[b]	63	0.328	11.5	0.210	0.1356			Damp
14185[c]	63	0.312	11.5	0.412	0.0771			Damp
14186[b]	63	0.320	27.1	0.141	0.0723			Damp
14187[c]	63	0.320	27.1	0.330	0.0409			Damp
14188[b]	63	0.307	59.3	0.0891	0.0408	0.01	0.0891	Damp
14189[c]	63	0.318	59.3	0.0993	0.0390	0.01	0.0993	Damp
14190[b]	64	0.282	162.0			0.15	0.299[d]	Damp
14191[c]	64	0.360	162.0			0.15	0.0324	Damp
06033	31	0.0828	37.7	0.0497	0.0796			Damp
06036	31	0.0707	50.7			0.15	0.0197	Damp

a Or gram per plant part
b Stalks from windward edge of the plot
c Stalks from center of the plot
d Lower leaves splattered with mud

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
13. Grass (Wheat)(continued)								
06070	58	0.282	28.9	0.260	0.0466	0.07	0.260	Damp
06077	58	0.249	37.7			0.25	0.198	Damp
06553	57	0.430	26.3	0.480	0.0279			Dry
14. Lettuce								
01239-1						0.11	0.214	Damp
01268-1						0.23	0.554	Damp
01365-1						0.13	0.341	Damp
01372-1						0.13	0.293	Damp
01388-1			29.6	0.493	0.0239	0.14	0.144	Damp
01388-1						0.01	0.493	Damp
01419-1			39.8	0.306	0.0297	0.20	0.306	Damp, dry
01438-1			75.7	0.225	0.0197	0.20	0.225	Damp, dry
01438-1			35.8	0.736	0.00856			Damp
13136-1						0.18	0.538	Damp
13211-1						0.10	0.520	With rain
13313-1						0.04	0.405	With rain
24070-1						0.09	1.29	Damp
14146	78	0.271	5.1	0.738	0.0596			Damp
14529	111	1.60	45.5	0.648	0.00957			Damp
14746	179	7.67	724.5	0.537	0.00086	0.03	0.537	Damp
14774	180	5.10	56.1	1.028	-			Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	T (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				14. Lettuce (continued)				
14789	180	8.57	147.5	3.34	-	0.07	3.34	Damp
06151	85	0.170	32.4	0.374	0.0304			Damp
06229	108	0.327	11.1	0.517	0.0594			Damp
06240	108	0.221	27.7	0.221	0.0460	0.02	0.280	Damp
				15. Onion				
24067-1						0.09	0.562	Damp
24112-1			63.7	0.254	0.0215			Dry
24166-1			87.4	0.0456	0.0353			Damp
24182-1			106.3	0.0398	0.0303			Damp
14415	142	0.363	5.1	0.669	0.0790			Damp
14433	142	0.121	26.2	0.391	0.0359			Damp
14527	175	0.802	45.5	0.356	0.0227			Damp
14744	243	7.19	724.5	0.320	0.00157	0.03	0.320	Semidamp
14781	244	3.06	56.1	0.330	0.0198			Damp
14786	244	3.03	147.5	0.119	0.0144	0.07	0.119	Damp
06153	85	0.0264	32.4	0.141	0.0605			Damp
06232	108	0.137	11.1	0.316	0.1037			Damp
06243	108	0.195	27.7	0.0968	0.0843	0.02	0.0968	Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				16. Pea				
14530	29	0.157	45.5	0.265	0.0292			Damp
14777	66	5.02	56.1	0.300	0.0215			Damp
14791	66	5.49	147.5	0.0477	0.0206	0.07	0.0477	Damp
06404	24	0.295	26.0	0.191	0.0637			Damp
06405	56	1.54	26.0	0.127	0.0794			Damp
06451	59	1.49	25.1	0.145	0.0770			Damp
06452	27	0.202	25.1	0.476	0.0295			Damp
06543	58	6.70	26.3	0.541	0.0234			Dry
06544-2	90	0.483	26.3	0.822	0.00744			Dry
06628	61	5.04	13.6	0.209	0.1152			Damp
				17. Pepper				
14526	111	0.131	45.5	0.669	0.00883			Damp
14743	179	1.17	724.5	0.822	0.00027	0.03	0.822	Damp
14771	180	1.10	56.1	0.139	0.0352			Damp
14787	180	1.73	147.5	0.884	0.00084	0.07	0.884	Damp
06402	137	0.805	26.0	0.524	0.0249			Damp
				18. Poppy				
24020-1						0.80	0.0624	Damp,dry
24025-1						0.41	0.164	Damp,dry
24056-1			88.8	0.0241	0.0420			Dry

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				19. Potato				
01237-1						0.11	0.469	Damp
01264-1						0.23	0.491	Damp
01364-1						0.13	0.374	Damp
01371-1						0.13	0.368	Damp
01390-1			29.6	1.18	-	0.14	0.433	Damp
01390-1						0.01	1.18	Damp
01417-1			39.8	0.124	0.0525	0.20	0.124	Damp,dry
01417-1						0.34	0.0437	Damp
01436-1			75.7	0.468	0.0100	0.20	0.468	Damp,dry
01436-1						0.34	0.172	Damp
01519-1			51.0	0.237	0.0282			Damp
01519-1			21.7	0.264	0.0613			Damp
01533-1			11.5	0.119	0.185			Dry
13137-1						0.18	0.260	Dry
13306-1						0.04	0.519	With rain
13307-1						0.04	0.461	With rain
22057-1			37.9	0.270	0.0346	0.01	0.270	Damp,dry
24065-1						0.09	0.577	Damp
24111-1			63.7	0.307	0.0185			Dry
24165-1			87.4	0.0606	0.0321			Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				19. Potato (continued)				
24181-1			106.3	0.204	0.0128			Damp
14775	98	1.67	56.1	0.918	0.00152			Damp
06403	56	1.60	26.0	0.829	0.00717			Damp
06453	59	1.48	25.1	0.316	0.0459			Damp
06547	90	2.83	26.3	0.581	0.0207			Dry
06547	90	2.83	26.3	0.330	0.0421			Dry
06548	90	2.79	26.3	0.838	0.00674			Dry
06548	90	2.79	26.3	0.476	0.0282			Dry
06627	93	2.58	13.6	0.403	0.0650			Damp
				20. Radish				
14605	53	0.331	66.8	0.747	0.00438			Dry
06401	56	0.281	26.0	0.404	0.0349			Damp
06455	59	0.408	25.1	0.520	0.0261			Damp
06560	90	0.514	26.3	0.575	0.0210			Dry
				21. Rose				
01411-1						0.20	0.606	Dry
				22. Squash (Zucchini)				
14054-1	30	0.131	74.7			1.03	17.8	Dry
14139	59	1.20	17.2	0.146	0.1119			Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
22. Squash (Zucchini) (continued)								
14152	59	1.50	32.9	0.100	0.0700			Damp
14162	59	1.56	47.2			0.30	1.07	Damp
14318-1	109	1.18	11.3	0.463	0.0681			Damp
14321	109	1.52	17.6	0.371	0.0563			Damp
14344-1	113	2.49	5.0	0.557	0.1170			Damp
14345-1	113	1.84	9.9	0.669	0.0406			Damp
14410-1	142	4.96	5.1	0.460	0.1522			Damp
14410-1	142	4.96	5.1	0.711	0.0668			Damp
14411-1	142	2.36	5.1	0.348	0.2070			Damp
14411-1	142	2.36	5.1	0.537	0.1219			Damp
14422-1	142	2.26	12.2	0.561	0.0474			Damp
14422-1	142	2.26	12.2	0.868	0.0116			Damp
14431-1	142	1.77	26.2	0.488	0.0273			Damp
14431-1	142	1.77	26.2	0.755	0.0107			Damp
14442-1	142	1.65	33.3	0.498	0.0210			Damp
14442-1	142	1.65	33.3	0.769	0.00788			Damp
14525-1	111	1.59	45.5	0.470	0.0166			Damp
06026	30	0.222	37.7	0.113	0.0578			Damp
06037	57	0.981	28.9	0.465	0.0265	0.07	0.465	Damp
06038	30	0.184	50.7			0.15	0.202	Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
22. Squash (Zucchini) (continued)								
06156-1	85	0.596	32.4	0.410	0.0275			Damp
06188-1	86	0.770	22.8			0.77	0.0703	Damp
06234-1	108	1.57	11.1	0.712	0.0307			Damp
06245-1	108	1.12	27.7	0.638	0.0162	0.02	0.638	Damp
23. Tomato								
13308-1						0.04	0.309	With rain
13309-1						0.04	0.209	With rain
24072-1						0.09	0.412	Damp
24116-1			63.7	0.342	0.0168			Dry
24173-1			87.4	0.523	0.00740			Damp
24186-1			106.3	0.652	0.00403			Damp
14413	142	1.70	5.1	0.792	0.0458			Damp
14423	142	2.40	12.2	0.828	0.0155			Damp
14432	142	3.58	26.2	0.650	0.0164			Damp
06029	30	0.00614	37.7	0.240	0.0379			Damp
06041	30	0.00590	50.7			0.15	0.482	Damp

a Or gram per plant part

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Y_w	k_w (mi^{-1})	R (inches)	Y_{WT}	Initial Conditions
			24. Barley (Stalks)[b]					
14250	89	1.94				0.43	0.0404 0.0557	Damp
14257	90	1.94				1.20	0.0157 0.0217	Damp
14438	143	2.15	33.3	0.245 0.285	0.0423 0.0377			Damp
14471	143	2.00	58.5			0.35	0.283 0.306	Damp
06159	86	1.09	32.4	0.332 0.325	0.0340 0.0347			Damp
06191	87	1.42	22.8			0.77	0.0127 0.0162	Damp
06256	109	2.04	28.1			0.54	0.0605 0.0783	Damp
			25. Barley (Heads)[b]					
14229-2	87	0.527	22.1	0.577 0.423	0.0249 0.0390			Damp
14250-2	89	0.[illegible]66				0.43	0.0830 0.116	Dry

a Or gram per plant part

b Second value of Y_w or Y_{WT} from ratio of F_L values

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	γ_w	k_w (mi^{-1})	R (inches)	γ_{wr}	Initial Conditions
			25. Barley (Heads)[b] (continued)					
14254-2	90	0.839				1.20	0.0137 0.0240	Dry
14310-2	110	0.913	3.0	0.715 0.607	0.1121 0.1666			Damp
14315-2	110	0.739	6.2	0.393 0.270	0.1504 0.2114			Damp
14320-2	110	0.572	11.3	0.247 0.132	0.1237 0.1791			Damp
14327-2	110	0.603	17.6	0.154 0.0864	0.1063 0.1391			Damp
14333-2	110	0.598	23.0	0.0389 0.0216	0.1412 0.1668	0.07	0.0389 0.0216	Damp
14419-2	143	1.03	5.1	1.00 0.867	- 0.0280			Damp
14429-2	143	1.07	26.2	0.545 0.490	0.0232 0.0272			Damp
14438-2	143	0.966	33.3	0.347 0.281	0.0318 0.0381			Damp

a Or gram per plant part
b Second value of γ_w or γ_{wr} from ratio of F_L values

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				25. Barley (Heads)[b] (continued)				
14462-2	143	0.960	47.2	0.306	0.0251			Damp
				0.246	0.0297			
14466-2	143	1.02	58.5			0.35	0.0938	Damp
							0.0829	
06148-2	86	0.557	32.4	0.495	0.0217			
				0.464	0.0237			
06186-2	87	0.609	22.8			0.77	0.0218	Damp
							0.0200	
06237-2	109	0.808	11.1	0.907	0.00871			Damp
				0.794	0.0207			
06249-2	109	0.898	27.7	0.762	0.00981	0.02	0.762	Damp
				0.742	0.0108		0.742	
06256-2	109	0.977	28.1			0.54	0.0245	Damp
							0.0259	
				26. Oats (Stalks)[b]				
14248	89	1.77				0.43	0.0768	Damp
							0.122	
14261	90	1.27				1.20	0.0127	Damp
							0.0146	
14437	143	1.66	33.3	0.393	0.0281			Damp
				0.301	0.0360			
14470	143	2.07	58.5			0.35	0.0684	Damp
							0.0650	

a Or gram per plant part

b Second value of Ψ_w or Ψ_{wr} from ratio of F_L values

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
			26. Oats (Stalks)[b] (continued)					
06161	86	1.78	32.4	0.124	0.0645			
				0.112	0.0676			
06190	87	2.31	22.8			0.77	0.0354	Damp
							0.0417	
06254	109	2.24	28.1			0.54	0.0793	Damp
							0.0944	
			27. Oats (Heads)[b]					
14228-2	87	0.229	22.1	0.816	0.00917			Damp
				0.568	0.0256			
14248-2	89	0.355				0.43	0.0130	Dry
							0.0123	
14253-2	90					1.20	0.00622	Dry
							0.00666	
14309-2	110	0.570	3.0	0.574	0.1850			Damp
				0.606	0.1674			
14314-2	11[illegible]	0.687	6.2	0.553	0.0955			Damp
				0.704	0.0565			
14326-2	110	0.564	17.6	0.0923	0.1354			Damp
				0.0966	0.1328			

a Or gram per plant part

b Second value of Ψ_w or Ψ_{wr} from ratio of F_L values

Table 9 (continued)

Sample Number	Age (days)	mp (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
			27. Oats (Heads)[b] (continued)					
14332-2	110	0.598	23.0	0.0307	0.1515	0.07	0.0307	Damp
				0.0340	0.1470		0.0340	
14418-2	143	1.18	5.1	0.379	0.1901			Damp
				0.530	0.1246			
14428-2	143	0.731	26.2	0.196	0.0622			Damp
				0.171	0.0674			
14437-2	143	0.628	33.3	0.177	0.0520			Damp
				0.132	0.0609			
14461-2	143	0.835	47.2	0.100	0.0487			Damp
				0.0994	0.0489			
14465-2	143	0.688	58.5			0.35	0.0219	Damp
							0.0179	
14533-2	176	1.28	45.5	0.417	0.0192			Damp
				0.355	0.0240			
06150-2	86	0.423	32.4	0.200	0.0497			Damp
				0.137	0.0613			
06185-2	87	0.526	22.8			0.77	0.0161	Damp
							0.0187	
06236-2	109	0.736	11.1	0.392	0.0844			Damp
				0.480	0.0660			

a Or gram per plant part

b Second value of Ψ_w or Ψ_{wr} from ratio of F_L values

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
			27. Oats (Heads)[b] (continued)					
06248-2	109	0.558	27.7	0.221	0.0545	0.02	0.221	Damp
				0.205	0.0572		0.205	
06254-2	109	0.497	28.1			0.54	0.0214	Damp
							0.0176	
			28. Rye (Stalks)					
14440	143	1.27	33.3	0.314	0.0348			Damp
14472	143	1.14	58.5			0.35	0.127	Damp
06258	109	0.821	28.1			0.54	0.0728	Damp
06408	201	0.810	26.0	0.395	0.0357			Damp
			29. Rye (Heads)					
14311-2	110	0.238	3.0	0.746	0.0975			Damp
14316-2	110	0.165	6.2	0.641	0.0717			Damp
14328-2	110	0.270	17.6	0.395	0.0527			Damp
14334-2	110	0.166	23.0	0.296	0.0530	0.07	0.296	Damp
14420-2	143	0.265	5.1	0.607	0.0980			Damp
14426-2	143	0.200	12.2	0.518	0.0540			Damp
14430-2	143	0.265	26.2	0.154	0.0714			Damp
14440-2	143	0.195	33.3	0.123	0.0629			Damp

a Or gram per plant part

b Second value of Ψ_w or Ψ_{wr} from ratio of F_L values

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
			29. Rye (Heads) (continued)					
14463-2	143	0.259	47.2	0.146	0.0408			Damp
14467-2	143	0.171	58.5			0.35	0.0173	Damp
14534-2	176	0.285	45.5	0.202	0.0352			Damp
14607-2	200	0.279	66.8	0.0457	0.0462			Dry
06147-2	86	0.192	32.4	0.225	0.0461			Damp
06187-2	87	0.188	22.8			0.77	0.0236	Damp
06238-2	109	0.184	11.1	0.581	0.0490			Damp
06250-2	109	0.135	27.7	0.307	0.0427	0.02	0.307	Damp
06258-2	109	0.138	28.1			0.54	0.0324	Damp
06346-2	176	0.194	102.0	0.0539	0.0286			Damp
06407-2	201	0.192	26.0	0.251	0.0531			Damp
06459-2	204	0.272	25.1	0.322	0.0451			Damp
06556-2	235	0.394	26.3	0.275	0.0491			Dry
				30. Wheat (Stalks)[b]				
14246	89	0.894				0.43	0.0582	Damp
							0.0813	
14256	90	0.701				1.20	0.00994	Damp
							0.0108	

a Or gram per plant part

b Second value of Ψ_w or Ψ_{wr} from ratio of F_L values

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
30. Wheat (Stalks)[b] (continued)								
14434	143	0.960	33.3	0.327	0.0335			Damp
				0.453	0.0238			
14469	143	0.768	58.5			0.35	0.0556	Damp
							0.0616	
14779	65	0.903	56.1	0.138	0.0354			Damp
				0.152	0.0336			
14793	65	0.976	147.5	0.0471	0.0207	0.07	0.0471	Damp
				0.0582	0.0193		0.0582	
06160	86	0.966	32.4	0.236	0.0446			Damp
				0.258	0.0418			
06189	87	0.972	22.8			0.77	0.0945	Damp
							0.103	
06252	109	1.13	28.1			0.54	0.0278	Damp
							0.0287	
31. Wheat (Heads)								
14227-2	87	0.160	22.1	0.659	0.0189			Damp
				0.589	0.0240			
14246-2	89	0.174				0.43	0.0409	Dry
							0.0396	

a Or gram per plant part

b Second value of Ψ_w or Ψ_{wr} from ratio of F_L values

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
			31. Wheat (Heads)[b] (continued)					
14252-2	90	0.150				1.20	0.00820	Dry
							0.00693	
14308-2	110	0.270	3.0	0.511	0.2242			Damp
				0.595	0.1735			
14313-2	110	0.267	6.2	0.257	0.2192			Damp
				0.294	0.1976			
14319-2	110	0.260	11.3	0.207	0.1393			Damp
				0.231	0.1296			
14325-2	110	0.276	17.6	0.0795	0.1439			Damp
				0.0947	0.1340			
14331-2	110	0.291	23.0	0.0452	0.1347	0.07	0.0452	Damp
				0.0567	0.1248		0.0567	
14339-2	114	0.329	5.1	0.531	0.1242			Damp
				0.532	0.1237			
14340-2	114	0.369	9.8	0.316	0.1175			Damp
				0.355	0.1058			
14341-2	114	0.345	16.2	0.269	0.0810			Damp
				0.283	0.0779			

a Or gram per plant part

b Second value of Ψ_w or Ψ_{wr} from ratio of F_L values

Table 9 (continued)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
			31.	Wheat (Heads)[b]	(continued)			
14342-2	114	0.333	19.6	0.284	0.0643			Damp
				0.288	0.0636			
14417-2	143	0.330	5.1	0.848	0.0325			Damp
				0.823	0.0379			
14425-2	143	0.384	12.2	0.628	0.0381			Damp
				0.708	0.0283			
14427-2	143	0.367	26.2	0.277	0.0490			Damp
				0.298	0.0462			
14434-2	143	0.317	33.3	0.149	0.0572			Damp
				0.138	0.0595			
14460-2	143	0.336	47.2	0.0864	0.0519			Damp
				0.0852	0.0522			
14464-2	143	0.346	58.5			0.35	0.0536	Damp
							0.0545	
14532-2	176	0.646	45.5	0.109	0.0487			Damp
				0.109	0.0487			
14780-2	65	0.286	56.1	0.193	0.0293			Damp
				0.241	0.0254			
14794-2	65	0.291	147.5	0.0287	0.0241	0.07	0.0287	Damp
				0.0365	0.0225		0.0365	

a Or gram per plant part

b Second value of Ψ_w or Ψ_{wr} from ratio of F_L values

Table 9 (concluded)

Sample Number	Age (days)	m_p (gm/plant)[a]	τ (mi)	γ_w	k_w (mi^{-1})	R (inches)	γ_{wr}	Initial Conditions
			31. Wheat (Heads)[b] (continued)					
06149-2	86	0.176	32.4	0.184	0.0522			Damp
				0.164	0.0558			
06184-2	87	0.176	22.8			0.77	0.0134	Damp
							0.0130	
06235-2	109	0.426	11.1	0.298	0.1091			Damp
				0.291	0.1112			
06247-2	109	0.352	27.7	0.242	0.0512	0.02	0.242	Damp
				0.195	0.0590		0.195	
06252-2	109	0.343	28.1			0.54	0.0555	
							0.0436	

a Or gram per plant part

b Second value of γ_w or γ_{wr} from ratio of F_L values

Table 10

FOLIAR CONTAMINATION WEATHERING DATA FOR LARGE SHRUBS AND TREES

Sample Number	m_L (gm/leaf)	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
				1. Avocado			
14535-1	0.184	45.5	0.258	0.0298			Damp
14560-1	0.207	25.3	0.661	0.0164			Damp
				2. Camphor			
06347-1	0.0419	102.0	0.142	0.0191			Exposed, top leaves, damp
06416-1,3	0.0517	131.6			0.16	0.269	Exposed, NE side, damp
06417-1,3	0.0932	131.6			0.16	0.213	Protected, low, damp
064[illegible]-1,3	0.0933	27.5			0.48	0.124	Protected, low, damp
06433-1,3	0.0663	27.5			0.48	0.0457	Exposed, NE side, damp
06434-1,3	0.0671	27.5			0.48	0.204	Exposed, SW side, damp
06470-1,3	0.0585	98.6	0.312	0.0121			Exposed, NE side, damp
06470-1,3	0.0717	98.6	0.262	0.0136			Protected, low, damp
06557-1	0.0685	26.3	0.197	0.0618			Protected, dry
06557-1,3	0.0759	26.3	0.236	0.0549			Protected, dry
06558-1	0.0528	26.3	0.498	0.0264			Exposed, NE side, dry
06558-1,3	0.0596	26.3	0.519	0.0250			Exposed, NE side, dry
				3. Grapefruit			
16173s-1[a]	0.471	12.1	0.291	0.1020			Dry
16184s-1	0.527	12.1	0.460	0.0641			Dry

a Letter s for a group of leaf samples, averaged values of m_L and a_L

Table 10 (concluded)

Sample Number	m_L (gm/leaf)	τ (mi)	Ψ_w	k_w (mi^{-1})	R (inches)	Ψ_{wr}	Initial Conditions
			3. Grapefruit (continued)				
16209s-1[a]	0.204	12.1	0.605	0.0415			Dry
16217s-1	0.218	12.1	0.864	0.0122			Dry
16229s-1	0.300	12.1	1.16	-			Dry
All PW	0.310	12.1	0.679	0.0320			Dry
16247s-1	0.649	28.1	0.513	0.0238			Dry
16260s-1	0.378	28.1	0.312	0.0415			Dry
16269s-1	0.193	28.1	0.356	0.0367			Dry
16280s-1	0.341	28.1	0.334	0.0390			Dry
16288s-1	0.235	28.1	0.606	0.0179			Dry
All SW	0.443	28.1	0.380	0.0344			Dry
				4. Laurel			
15091-1	0.0987	33.5	0.513	0.0 99			Random leaves, damp
				5. Orange			
01184-1					0.03	0.436	Damp
01190-1		32.1	0.690	0.0116			Damp
01207-1					0.16	0.317	Damp
01224-1					1.48	0.00831	Damp
01414-1		39.8	0.755	0.00706	0.20	0.755	Dry

a Letter s for a group of leaf samples, averaged values of m_L and a_L

Table 11

AVERAGE PLANT DRY WEIGHTS, AGES, AND PLANTING DENSITIES
FOR EACH SAMPLING PERIOD AND CROP PLANTING

Station	Number of Plants	Age (days)	m_p (gm/plant)	σ^a (%)	n/xy (plants/sq ft)
		Bean-1			
14	8	29.8	0.657	8.3	3.0
14	13	58.8	2.13	19.6	3.0
14	10	85.7	2.85	31.1	3.0
06	7	29.9	0.296	12.2	3.0
06	14	57.0	0.730	29.3	3.0
		Bean-2			
14	16	17.9	0.135	22.1	3.0
14	6	50.0	1.05	8.9	3.0
06	12	18.0	0.157	15.8	3.0
		Bean-3			
06	10	26.5	0.176	11.9	3.0
06	16	86.2	1.31	24.4	3.0
		Bean-4			
14	15	91.4	3.46	39.0	3.0
14	7	121.4	12.9	21.8	3.0
		Bean-5			
14	26	22.8	0.250	14.2	3.0
14	19	63.3	1.07	10.8	3.0
14	7	91.8	5.19	20.8	3.0
06	37	25.9	0.216	17.3	3.0
06	32	58.5	0.494	14.4	3.0
		Bean-6			
06	59	12.3	0.0946	14.7	3.0
		Bean-7			
06	18	17.4	0.138	23.4	3.0

a Average deviation

Table 11 (continued)

Station	Number of Plants	Age (days)	m_p (gm/plant)	σ[a] (%)	n/xy (plants/sq ft)
		Bean Pods			
14	7	59.0	0.472	-	-
14	16	85.6	0.856	0.9	-
		Beet-1			
14	14	77.4	1.53	43.6	1.0
14	7	111.7	3.10	70.3	1.0
14	7	136.4	4.64	24.9	1.0
14	8	176.4	6.21	39.3	1.0
14	1	214.0	8.75	-	1.0
06	20	21.2	0.234	23.0	1.0
06	15	45.5	0.769	26.5	1.0
06	6	77.5	1.17	24.8	1.0
		Beet-2			
14	2	91.0	3.44	21.2	1.0
06	5	92.0	1.83	37.3	1.0
		Cabbage-1			
14	43	30.2	0.0861	24.6	0.5
14	17	58.9	0.879	15.6	0.5
14	7	86.9	13.3	17.8	0.5
14	5	110.4	53.7	26.6	0.5
14	4	140.8	87.0	14.2	0.5
06	24	30.5	0.0335	10.4	0.5
06	7	57.0	0.667	44.8	0.5
06	7	84.4	6.59	35.0	0.5
06	2	108.0	24.1	9.1	0.5
06	1	139.0	37.2	-	0.5
		Cabbage-2			
14	18	62.1	2.99	30.6	0.5
14	5	91.4	26.3	84.0	0.5
		Cabbage-3			
06	80	29.8	0.0446	18.2	0.5
06	6	62.5	0.462	33.8	0.5

a Average deviation

Table 11 (continued)

Station	Number of Plants	Age (days)	m_p (gm/plant)	σ^a (%)	n/xy (plants/sq ft)
			Carrot-1		
06	38	84.2	0.152	38.9	2.0
06	16	108.6	0.503	30.6	2.0
06	4	139.8	0.970	31.4	2.0
06	2	173.5	1.94	13.4	2.0
			Carrot-2		
14	5	112.0	0.635	26.3	2.0
14	18	136.8	0.821	20.3	2.0
14	17	176.6	1.77	31.9	2.0
14	3	205.7	8.76	39.6	2.0
06	5	173.2	1.54	19.6	2.0
			Carrot-3		
06	14	105.8	0.265	22.2	2.0
06	32	144.1	0.603	30.3	2.0
06	8	177.4	0.725	38.8	2.0
			Carrot-4		
06	[illegible]	95.4	0.226	27.6	2.0
			Corn-1		
14	25	30.4	0.234	21.4	0.67
14	17	58.9	0.357	17.9	0.67
14	8	86.1	8.66	62.0	0.67
14[b]	4	108.8	13.3	29.5	0.67
14[c]	2	108.5	21.6	14.5	0.67
14[b]	3	140.0	15.4	55.2	0.67
14[c]	3	140.0	26.1	41.0	0.67
06	12	29.8	0.119	34.2	0.67
06	10	57.0	1.26	17.5	0.67
06	6	84.7	9.64	31.5	0.67
06[c]	2	110.5	28.3	42.0	0.67

a Average deviation
b With tassel only
c With tassel and ears

Table 11 (continued)

Station	Number of Plants	Age (days)	m_p (gm/plant)	σ^a (%)	n/xy (plants/sq ft)
		Corn-2			
06	5	28.0	0.104	-	0.67
06	8	62.1	0.540	10.9	0.67
06	2	84.0	23.6	24.8	0.67
06[b]	2	119.0	112.8	24.0	0.67
06	7	121.4	64.5	16.4	0.67
06[b]	3	154.3	124.3	10.4	0.67
06[c]	3	154.3	149.0	4.9	0.67
		Corn-3			
14	22	35.4	0.127	29.4	0.67
14	7	58.7	0.530	35.3	0.67
14	2	102.3	13.4	1.1	0.67
06	10	34.5	0.0984	9.8	0.67
06	14	60.8	1.55	48.2	0.67
06	11	95.5	14.5	43.8	0.67
06	2	127.0	53.0	18.2	0.67
		Corn-4			
14	20	26.0	0.0702	22.4	0.67
14	8	59.9	5.89	20.1	0.67
14	4	92.5	26.6	35.5	0.67
		Lettuce-1			
06	33	84.5	0.189	23.9	2.0
06	16	108.6	0.297	13.6	2.0
06	3	139.0	0.899	-	2.0
		Lettuce-2			
14	21	77.8	0.220	27.4	2.0
14	8	111.6	1.16	49.6	2.0
14	7	137.3	5.95	54.8	1.0
14	8	176.2	12.0	36.8	0.6

a Average deviation
b With tassel only
c With tassel and ears

Table 11 (continued)

Station	Number of Plants	Age (days)	m_p (gm/plant)	σ[a] (%)	n/xy (plants/sq ft)
			Lettuce-2 (continued)		
06	5	79.0	0.260	-	2.0
06	3	111.0	0.669	1.4	2.0
			Lettuce-3		
06	5	91.8	1.09	81.6	2.0
			Onion-1		
14	10	108.5	0.143	0.7	6.0
14	33	141.7	0.400	29.7	6.0
14	12	175.8	0.864	55.3	2.0
14	12	201.2	1.61	26.2	2.0
14	12	239.9	3.51	42.2	2.0
14	9	270.8	5.74	59.9	2.0
06	40	56.5	0.0149	6.0	12.0
06	65	84.2	0.0405	39.4	12.0
06	19	109.0	0.184	9.4	6.0
06	8	140.9	0.235	65.0	6.0
06	2	172.0	0.474	-	6.0
			Onion-2		
06	84	96.2	0.0674	7.0	12.0
			Pea-1		
14	30	30.2	0.201	15.2	1.5
14	15	54.8	1.10	24.0	1.5
14	3	88.0	10.5	-	1.5
14[b]	15	88.7	0.609	8.5	-
06	20	30.5	0.156	16.5	1.5
06	24	56.9	1.39	22.8	1.5
06	1	93.0	5.25	-	1.5
06[b]	64	91.0	0.447	10.3	-

a Average deviation
b Pods

Table 11 (continued)

Station	Number of Plants	Age (days)	m_p (gm/plant)	σ[a] (%)	n/xy (plants/sq ft)
			Pea-2		
14	10	26.0	0.234	21.2	1.5
14	13	60.8	5.22	15.8	1.5
14	6	91.5	10.3	31.1	1.5
14[b]	13	92.6	1.14	13.0	-
06	35	25.8	0.260	10.2	1.5
06	26	58.9	4.99	15.2	1.5
06	3	90.7	12.5	50.1	1.5
			Pepper-1		
14	30	78.7	0.0443	26.3	1.5
14	20	111.0	0.125	13.0	1.5
14	26	137.2	0.322	28.5	1.5
14	21	176.0	0.982	20.4	1.5
14	5	206.4	3.46	67.6	1.5
06	9	137.9	0.723	46.2	1.5
06	2	170.0	0.438	-	1.5
06	3	206.1	1.24	17.2	1.5
			Potato-1		
14	2	56.5	1.00	12.7	0.5
14	5	94.0	2.48	20.0	0.5
14	4	123.8	1.77[c]	46.5	0.5
06	9	56.9	2.08	40.6	0.5
06	16	90.6	4.47	30.7	0.5
06	3	125.0	3.02[c]	13.5	0.5
			Radish-1		
14	24	54.7	0.375	31.1	4.0
14	7	89.6	1.50	26.3	4.0
06	35	57.1	0.390	23.3	4.0
06	33	90.8	1.10	35.1	4.0
06	4	122.5	1.04[c]	11.0	4.0

a Average deviation

b Pods

c Lower muddy, torn, and partially decayed or dead leaves removed during washing

Table 11 (continued)

Station	Number of Plants	Age (days)	m_p (gm/plant)	σ^a (%)	n/xy (plants/sq ft)
			Squash-1		
14	2	29.0	1.15	9.6	0.75
14	9	58.9	1.25	25.4	0.75
14[b]	3	87.3	5.27	58.7	0.25
14[c]	4	86.2	0.356	39.5	-
14[b]	2	111.5	30.4	32.6	0.25
14[c]	3	108.7	0.997	11.1	-
14[b]	11	141.7	67.1	23.8	0.25
14[c]	4	141.2	14.8	79.2	-
06	7	30.0	0.200	6.5	0.75
06	4	57.0	2.73	37.0	0.75
06[b]	8	84.6	9.08	17.7	0.25
06[b]	3	108.0	18.2	12.4	0.25
06	1	139.0	55.7	-	0.25
			Squash-2		
14[b]	6	112.2	23.7	32.4	0.25
			Squash-4		
14	1	100.0	22.3	-	0.25
06	2	62.0	0.538	-	0.75
			Tomato-1		
14	76	30.3	0.0324	17.3	6.0
14	5	58.4	0.118	15.4	2.0
14	2	108.5	2.01	6.5	0.5
14	4	142.0	2.50	21.8	0.5
06	76	29.7	0.00538	10.1	6.0
06	5	56.6	0.130	9.5	2.0
			Tomato-2		
14	4	77.2	0.860	19.5	1.0
			Tomato-3		
14	3	130.0	2.56	-	1.0
			Tomato-4		
14	2	92.0	0.820	-	2.0
06	9	90.6	0.0846	25.7	2.0

a Average deviation
b Plant plus fruit
c Fruit

Table 11 (continued)

Station	Number of Plants	Age (days)	m_p (gm/plant)	σ[a] (%)	n/xy (plants/sq ft)	(Weight Head / Weight Stalk)
			Barley-1			
14	57	32.4	0.0936	13.2	78	
14	117	60.5	0.572	10.3	55	
14	26	88.7	1.78	9.7	30	
14[b]	35	87.7	0.655	14.6	-	0.403
14	7	109.5	1.65	1.0	30	
14[b]	35	109.9	0.793	23.8	-	0.639
14	25	143.0	1.89	7.5	30	
14[b]	50	142.9	1.05	6.6	-	0.571
06	65	30.9	0.100	1.5	78	
06	97	57.9	0.513	1.9	55	
06	25	85.6	1.35	15.2	29	
06[b]	35	85.9	0.637	8.9	-	0.474
06	25	108.8	1.78	10.0	29	
06[b]	35	108.9	0.908	8.9	-	0.522
06	5	143.0	1.91	-	29	
06[b]	20	140.5	0.945	3.7	-	0.500
			Barley-2			
14	20	58.2	0.443	6.8	15	
14	20	90.4	0.781	1.4	15	
06	100	26.6	0.0657	8.0	50	
06	100	59.4	0.375	21.0	15	
06	25	90.2	0.942	1.2	15	
			Oats-1			
14	43	32.2	0.158	3.9	84	
14	151	61.0	0.498	14.8	76	
14	28	88.6	1.31	17.5	30	
14[b]	35	87.7	0.312	20.0	-	0.256
14	7	109.3	1.29	3.7	30	
14[b]	30	109.8	0.582	10.4	-	0.411
14	25	143.0	2.02	9.4	27	
14[b]	45	142.7	0.818	16.9	-	0.363
14[b]	25	176.4	1.49	20.8	27	-
06	78	30.9	.0987	17.4	84	
06	96	57.9	0.611	16.6	76	

a Average deviation
b Heads

Table 11 (continued)

Station	Number of Plants	Age (days)	m_p (gm/plant)	σ[a] (%)	n/xy (plants/sq ft)	$\left(\frac{\text{Weight Head}}{\text{Weight Stalk}}\right)$
			Oats-1 (continued)			
06	25	85.6	2.17	10.7	31	
06[b]	35	85.9	0.520	20.5	-	0.256
06	25	108.8	1.97	11.1	31	
06[b]	30	109.2	0.615	15.7	-	0.295
06	5	143.0	2.73	-	22	
06[b]	15	141.3	1.06	1.6	-	0.383
06[b]	8	173.4	1.20	4.3	-	-
			Oats-2			
14	100	20.8	0.0274	22.8	[illegible]	
14	75	59.8	0.369	16.8	50	
14	15	88.7	0.796	23.8	50	
06	120	59.0	0.306	11.2	50	
			Rye-1			
14	144	31.8	0.0736	4.2	89	
14	156	61.1	0.118	9.7	140	
06	90	30.9	0.0499	20.7	71	
06	110	57.9	0.209	16.3	154	
			Wheat-1			
14	251	31.8	0.0559	5.4	97	
14	394	61.8	0.317	7.6	111	
14	31	88.5	0.754	13.2	30	
14[b]	35	87.7	0.157	11.0	-	0.210
14	7	109.3	0.790	9.2	30	
14[b]	60	111.6	0.297	21.6	-	0.329
14	25	143.0	0.787	17.7	37	
14[b]	55	142.9	0.336	10.6	-	0.424
14[b]	25	176.4	0.666	5.0	-	
06	76	30.9	0.0762	10.3	60	
06	91	57.9	0.329	18.4	93	
06	25	85.6	0.983	6.7	27	
06[b]	35	85.9	0.189	10.9	-	0.198
06	25	108.8	1.19	5.7	27	
06[b]	35	108.9	0.390	9.0	-	0.329
06	5	143.0	1.46	-	34	
06[b]	15	140.3	0.560	3.6	-	0.373
06[b]	10	173.5	0.656	4.0	-	

a Average deviation

b Heads

Table 11 (concluded)

Station	Number of Plants	Age (days)	m_p (gm/plant)	σ[a] (%)	n/xy (plants/sq ft)	$\left(\frac{\text{Weight Head}}{\text{Weight Stalk}}\right)$
			Wheat-2			
14	40	56.2	0.350	10.6	24.6	
14	50	64.8	0.941	9.9	24.6	
14[b]	56	64.0	0.241	10.6	-	0.292
14	25	90.3	1.82	7.3	24.6	
14[b]	15	89.7	0.476	10.1	-	0.282
06	110	57.7	0.411	10.6	22.9	
06	10	61.0	0.587	-	22.9	
06[b]	12	61.0	0.192	-	-	0.328
06	30	92.2	1.61	17.2	22.9	
06[b]	31	89.2	0.421	33.4	-	0.304

a Average deviation
b Heads

Figure 1

FREQUENCY DISTRIBUTION OF PLANT OR PLANT PART DRY WEIGHTS

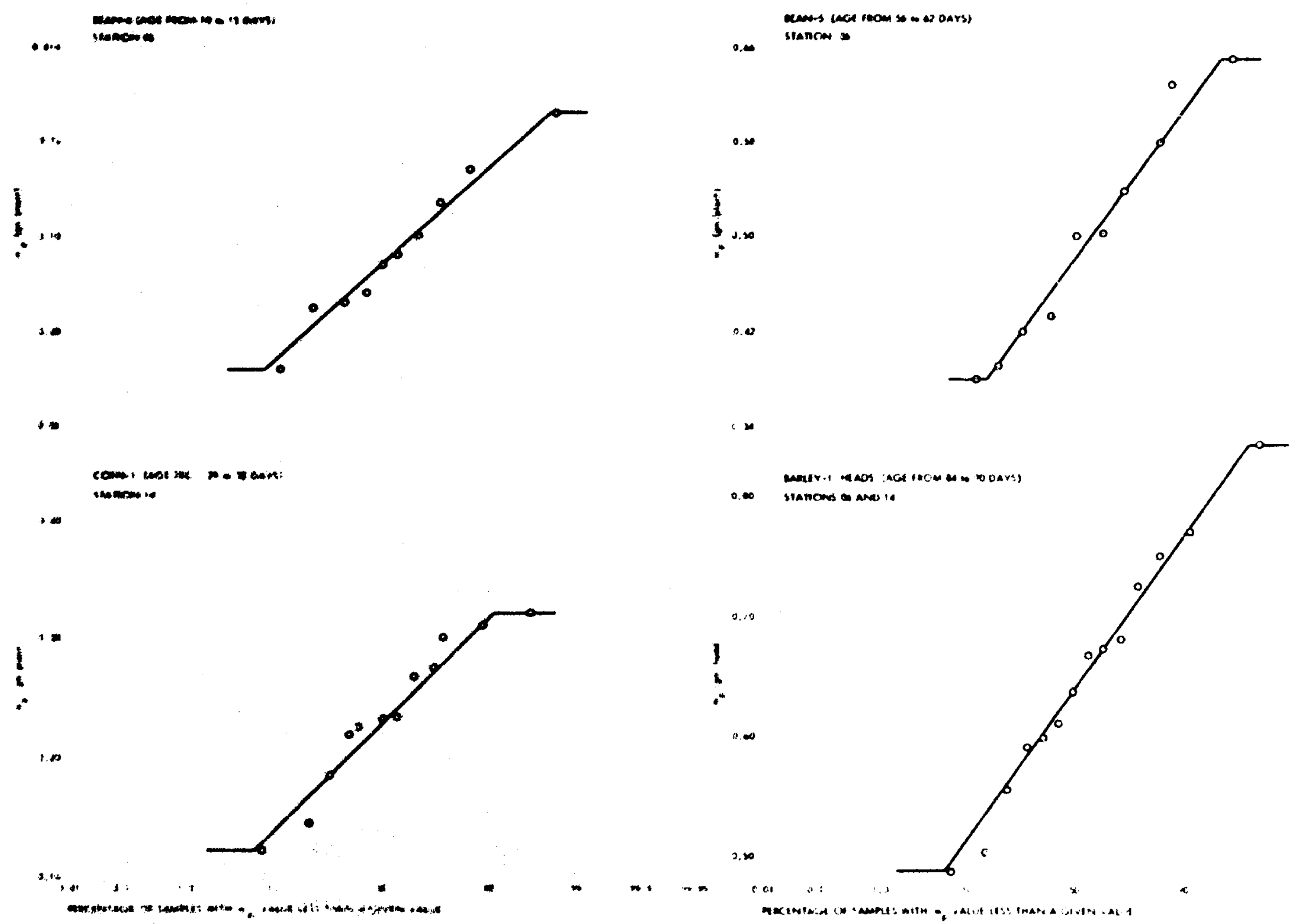


Table 12

AVERAGE WEIGHTS OF TREE LEAVES AND NEEDLES

	Number of Leaves	m_L (gm/leaf)	σ[a] (percent)
Avocado	172 (new)	0.211	25.9
Avocado	67 (old)	0.299	21.5
Camphor	466	0.697	23.8
Grapefruit	36 (new)	0.270	42.0
Grapefruit	225 (old)	0.377	54.2
Grapefruit	1,344	0.326	48.3
Laurel	4,013	0.0940	10.5
Pine[b]	5,380	0.0675	3.2

a Average deviation
b Needles

Figure 2

NUMBER DISTRIBUTION OF GRAPEFRUIT LEAF DRY WEIGHTS

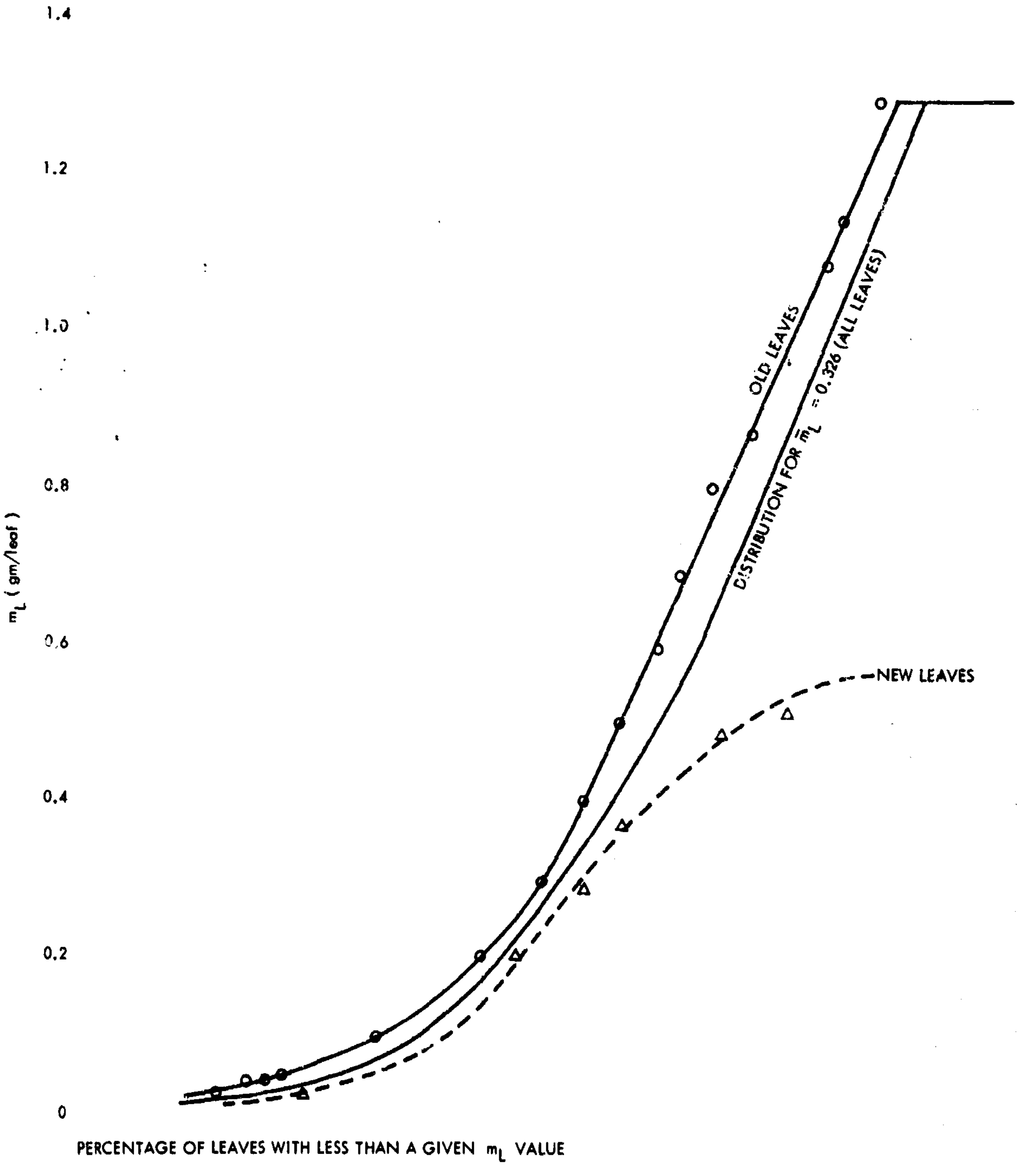


Table 13

LEAF AND OTHER PLANT PART PROJECTED AREA FREQUENCY DISTRIBUTION DATA SUMMARY

Sample Number	Age (days)	Number of Parts	Leaf Area in Square Feet at the Indicated Accumulated Number Percentage: 10%	50%	90%	Minimum Area (sq ft)	Maximum Area (sq ft)
1. Bean							
14658-1[a]	86	32	7.5×10^{-4}	8.3×10^{-3}	0.035	4.2×10^{-4}	0.052
14659-1	86	22	6.7×10^{-4}	0.018	0.027	5.6×10^{-4}	0.038
14833-1	122	19	0.010	0.052	0.095	8.1×10^{-3}	0.10
14837-1	122	9	0.010	0.031	0.062	8.7×10^{-3}	0.062
14839-1	93	23	9.5×10^{-3}	0.034	0.058	6.9×10^{-3}	0.075
06567-1	11	5	0.025	0.035	0.042	0.025	0.042
14833-2(+)[b]	122	17	5.3×10^{-3}	0.010	0.020	3.3×10^{-3}	0.022
14837-2(+)	122	8	2.3×10^{-3}	0.015	0.028	2.3×10^{-3}	0.028
14837-2(-)	122	8	1.0×10^{-3}	0.010	0.021	1.0×10^{-3}	0.021
14839-2(+)	93	11	1.2×10^{-3}	0.013	0.022	1.0×10^{-3}	0.022
14839-2(-)	93	11	1.4×10^{-3}	0.011	0.021	1.2×10^{-3}	0.021
2. Beet							
14669-1	170	11	4.6×10^{-3}	0.034	0.060	3.5×10^{-3}	0.062
14805-1	90	15	2.8×10^{-3}	0.020	0.027	1.4×10^{-3}	0.031
14848-1	214	17	0.012	0.050	0.074	8.4×10^{-3}	0.076

Table 13 (continued)

Sample Number	Age (days)	Number of Parts	Leaf Area in Square Feet at the Indicated Accumulated Number Percentage: 10%	50%	90%	Minimum Area (sq ft)	Maximum Area (sq ft)
			3. Cabbage				
14662-1	86	9	5.4×10^{-3}	0.044	0.107	5.4×10^{-3}	0.11
14663-1	86	9	3.3×10^{-3}	0.051	0.089	3.3×10^{-3}	0.089
14834-1	122	33	1.0×10^{-3}	0.034	0.37	5.6×10^{-4}	0.40
06565-1	58	14	1.8×10^{-3}	0.012	0.023	1.7×10^{-3}	0.029
			4. Carrot				
14841-1	207	13	0.028	0.14	0.18	0.023	0.18
06632-1	174	19	0.012	0.033	0.062	8.3×10^{-3}	0.081
			5. Corn				
14845-1	96	11	0.068	0.30	0.43	0.062	0.43
06559-1	120	12	0.078	0.50	0.80	0.056	0.82
06694-1	158	12	0.23	0.48	0.70	0.21	0.90
			6. Onion				
14667-1	234	9	2.2×10^{-3}	0.015	0.019	2.2×10^{-3}	0.019
14836-1(+)	270	10	0.026	0.062	0.076	0.025	0.076
14836-1(-)	270	10	0.026	0.062	0.073	0.024	0.074
14850-2	278	1	-	0.066	-	-	-
14850-2	278	1	-	0.016	-	-	-

Table 13 (continued)

Sample Number	Age (days)	Number of Parts	Leaf Area in Square Feet at the Indicated Accumulated Number Percentage 10%	50%	90%	Minimum Area (sq ft)	Maximum Area (sq ft)
7. Pea							
14844-1	93	40	0.018	0.043	0.050	0.016	0.050
14844-1[c]	93	10	0.022	0.046	0.050	0.021	0.052
06634-1	93	50	0.011	0.025	0.039	0.011	0.039
06634-1[c]	93	8	0.013	0.021	0.030	0.013	0.030
06635-1	61	33	0.011	0.024	0.060	0.010	0.062
06635-1[c]	61	13	0.017	0.037	0.080	0.016	0.11
14844-2(+)	93	8	0.011	0.017	0.021	0.011	0.021
14844-2(-)	93	8	4.1×10^{-3}	0.010	0.014	4.1×10^{-3}	0.014
06569-2(+)	90	10	4.0×10^{-3}	6.1×10^{-3}	0.011	4.0×10^{-3}	0.012
06569-2(-)	90	10	1.9×10^{-3}	2.9×10^{-3}	5.0×10^{-3}	1.8×10^{-3}	5.3×10^{-3}
8. Pepper							
14665-1	142	19	1.7×10^{-3}	5.1×10^{-3}	0.013	8.3×10^{-4}	0.014
14666-1	170	15	3.2×10^{-4}	3.3×10^{-3}	8.1×10^{-3}	2.1×10^{-4}	8.1×10^{-3}
14847-1	214	29	1.5×10^{-3}	6.4×10^{-3}	0.019	5.0×10^{-4}	0.041
9. Potato							
14843-1[d]	125	11	0.012	0.056	0.083	0.011	0.086
06521-1	89	58	0.014	0.034	0.055	5.3×10^{-3}	0.086
06563-1[d]	90	10	0.049	0.11	0.16	0.048	0.16

Table 13 (continued)

Sample Number	Age (days)	Number of Parts	Leaf Area in Square Feet at the Indicated Accumulated Number Percentage 10%	50%	90%	Minimum Area (sq ft)	Maximum Area (sq ft)
				10. Radish			
14660-1	88	20	9.8×10^{-4}	4.5×10^{-3}	0.056	8.3×10^{-4}	0.084
14661-1	88	20	1.1×10^{-3}	5.6×10^{-3}	0.056	1.0×10^{-3}	0.072
06566-1	90	20	5.7×10^{-3}	0.023	0.039	2.8×10^{-3}	0.043
				11. Squash			
14846-1	100	12	0.045	0.11	0.14	0.042	0.15
14846-2	100	6	-	0.012	-	7.8×10^{-3}	0.015
				12. Barley			
06631-1(1)[e]	61	10	0.029	0.045	0.050	0.028	0.051
06631-1(2)	61	10	0.023	0.038	0.043	0.023	0.048
06631-1(3)	61	10	0.019	0.029	0.035	0.018	0.036
06631-1(4)	61	9	0.016	0.023	0.030	0.016	0.031
06631-1(5)	61	9	0.010	0.014	0.020	0.010	0.020
06631-3	61	10	0.012	0.015	0.021	0.012	0.021
06675-1(1)	90	10	0.014	0.022	0.034	0.013	0.035
06675-1(2)	90	10	0.021	0.029	0.037	0.021	0.038
06675-1(3)	90	10	0.018	0.024	0.027	0.017	0.027
06675-1(4)	90	10	0.017	0.021	0.023	0.017	0.024
06675-1(5)	90	10	0.014	0.016	0.019	0.014	0.019
06675-1(6)	90	9	0.010	0.013	0.016	0.0065	0.018
06675-3	90	10	0.022	0.025	0.029	0.022	0.029

Table 13 (continued)

Sample Number	Age (days)	Number of Parts	Leaf Area in Square Feet at the Indicated Accumulated Number Percentage 10%	50%	90%	Minimum Area (sq ft)	Maximum Area (sq ft)
13. Oats							
06630-1(1)	61	10	0.018	0.027	0.037	0.018	0.038
06630-1(2)	61	10	0.024	0.026	0.029	0.024	0.030
06630-1(3)	61	10	0.014	0.019	0.025	0.013	0.026
06630-1(4)	61	10	0.010	0.011	0.014	9.4×10^{-3}	0.014
06630-3	61	10	2.4×10^{-3}	3.4×10^{-3}	4.6×10^{-3}	2.2×10^{-3}	4.7×10^{-3}
14. Wheat							
14782-1(1)	65	10	7.1×10^{-3}	0.012	0.017	7.1×10^{-3}	0.017
14782-1(2)	65	10	0.011	0.015	0.017	0.011	0.018
14782-1(3)	65	10	0.010	0.012	0.015	0.010	0.015
14782-1(4)	65	10	6.4×10^{-3}	8.0×10^{-3}	0.012	6.3×10^{-3}	0.012
14782-3	65	10	0.017	0.019	0.022	0.016	0.022
14835-1(1)	91	10	7.0×10^{-3}	9.4×10^{-3}	0.014	3.7×10^{-3}	0.014
14835-1(2)	91	10	5.6×10^{-3}	0.011	0.016	5.4×10^{-3}	0.016
14835-1(3)	91	10	5.6×10^{-3}	8.8×10^{-3}	0.012	5.5×10^{-3}	0.012
14835-3	91	10	0.020	0.022	0.024	0.020	0.024
06629-1(1)	60	10	0.011	0.015	0.019	0.011	0.019
06629-1(2)	60	10	8.0×10^{-3}	0.014	0.018	7.6×10^{-3}	0.018
06629-1(3)	60	10	6.0×10^{-3}	8.4×10^{-3}	0.011	6.0×10^{-3}	0.011
06629-1(4)	60	10	3.6×10^{-3}	5.7×10^{-3}	9.1×10^{-3}	3.4×10^{-3}	9.7×10^{-3}
06629-3	60	10	4.0×10^{-3}	6.2×10^{-3}	7.7×10^{-3}	3.9×10^{-3}	7.8×10^{-3}

Table 13 (continued)

Sample Number	Age (days)	Number of Parts	Leaf Area in Square Feet at the Indicated Accumulated Number Percentage 10%	50%	90%	Minimum Area (sq ft)	Maximum Area (sq ft)
				14. Wheat (continued)			
14782-2(+)	65	10	0.010	0.012	0.014	0.010	0.014
14782-2(-)	65	10	7.7×10^{-3}	8.9×10^{-3}	0.011	7.7×10^{-3}	0.011
06674-2(+)	89	8	5.8×10^{-3}	7.9×10^{-3}	8.1×10^{-3}	5.8×10^{-3}	8.1×10^{-3}
				15. Avocado			
All	-	101	0.015	0.029	0.064	4.4×10^{-3}	0.110
				16. Camphor			
All	-	49	4.3×10^{-3}	0.011	0.016	7.6×10^{-4}	0.022
				17. Grapefruit			
All	-	153	0.013	0.028	0.059	2.8×10^{-3}	0.077
				18. Laurel			
All	-	57	0.063	0.017	0.028	1.6×10^{-3}	0.039

Table 13 (concluded)

Sample Number	Age (days)	Number of Parts	Leaf Area in Square Feet at the Indicated Accumulated Number Percentage 10%	50%	90%	Minimum Area (sq ft)	Maximum Area (sq ft)
			19. Pine				
16004-1	-	-	-	1.6×10^{-3}	-	-	-

a -1 indicates leaves; -2 indicates fruit, pods or seed heads; -3 indicates stems
b (+) indicates maximum area; (-) indicates minimum area
c Stem leaves
d Projected area per branch of leaves
e (1) for top leaf; (2) for second leaf; (3) for third leaf, etc.

Figure 3

FREQUENCY DISTRIBUTION OF THE PROJECTED AREAS OF THE LEAVES FROM A BEAN AND A CABBAGE PLANT

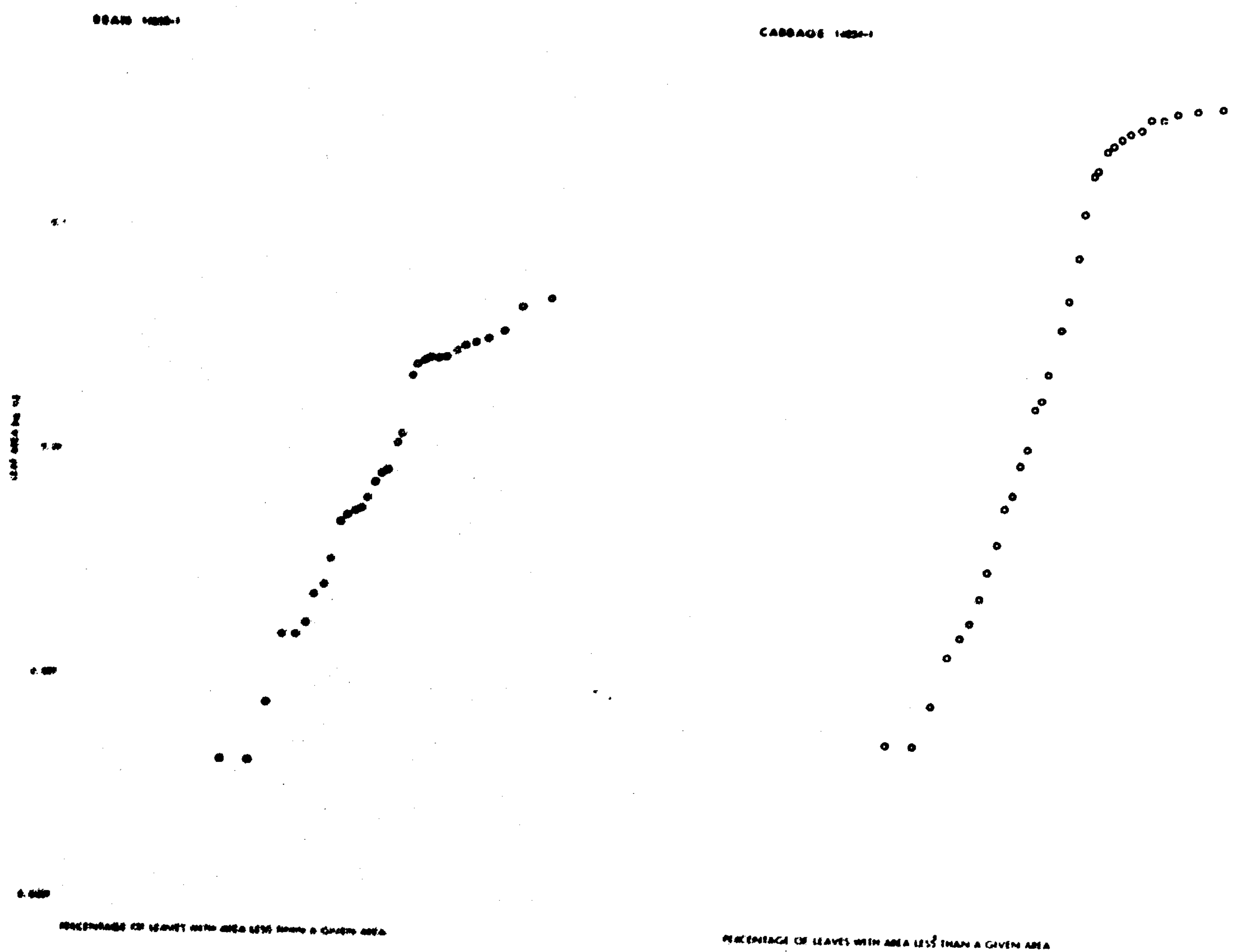


Figure 4

FREQUENCY DISTRIBUTION OF THE PROJECTED AREAS OF THE LEAVES FROM SINGLE PLANTS OF BEET, POTATO, CORN, AND RADISH

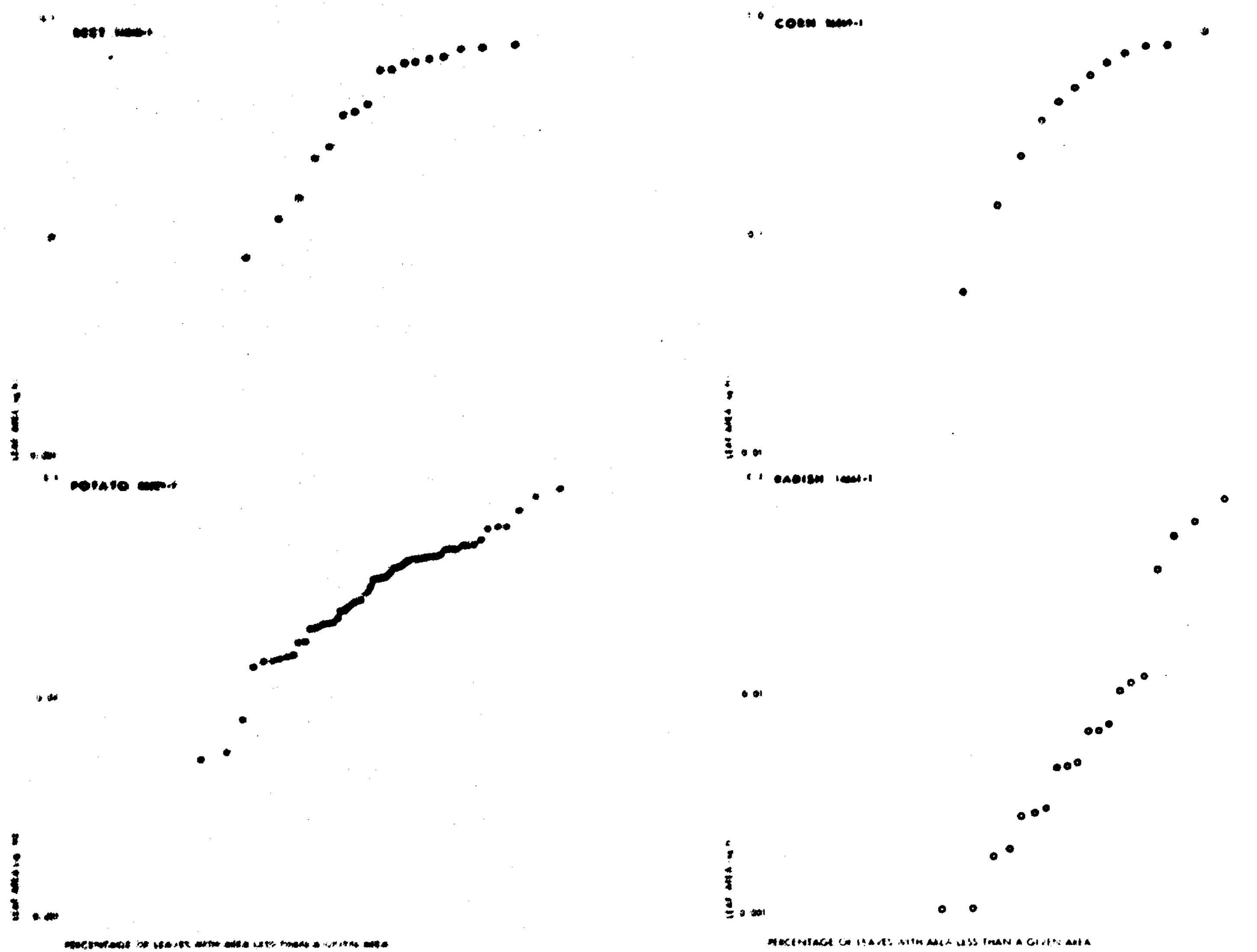
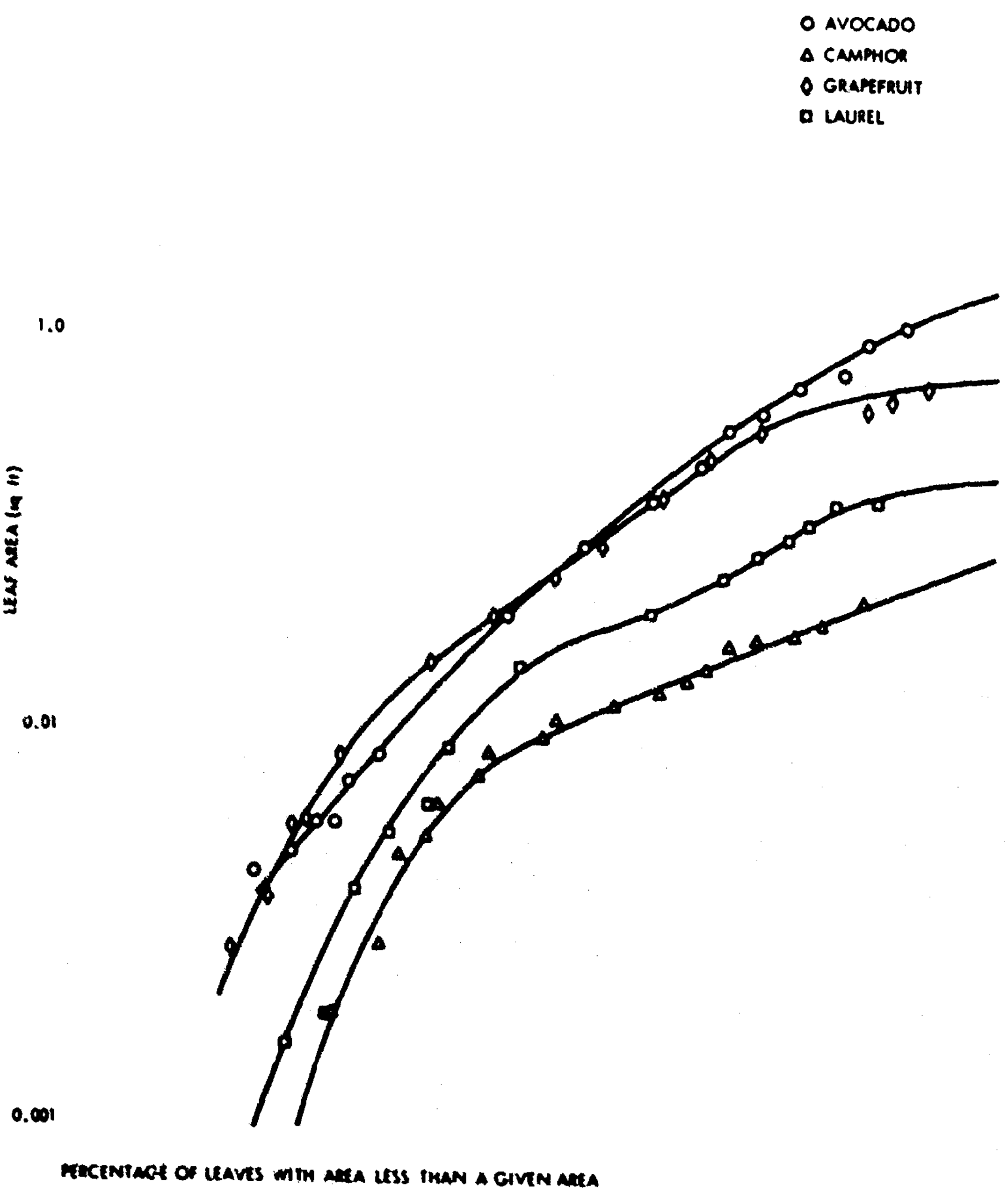


Figure 5

FREQUENCY DISTRIBUTION OF THE PROJECTED AREAS OF THE LEAVES FROM AVOCADO, CAMPHOR, GRAPEFRUIT, AND LAUREL TREES



DATA ANALYSIS

Foliar Contamination Functions

As indicated in the Background section, the major parameters on which the initial contamination of plants depend are the wind speed, the particle fall trajectory angle, the general geometric form of the plants, and the surface density of the foliage (represented by a combination of planting density and size or weight of the plants). The surface characteristics of the foliage, in general, appear to be a minor factor; however, since a surface characteristic of the foliage with regard to the retention of particles is not readily defined in a quantitative manner and since the shapes, forms, and densities, as well as the surface characteristics, of the leaves and other parts change from one species to another, no direct comparison of data for establishing the relative importance of leaf surface characteristics is possible. Another secondary parameter on which the initial contamination appears to depend is the relative humidity. The data in Part One indicate that, under damp conditions (i.e., where a shower of particles occurs when the relative humidity is 90 percent or greater), the foliage of all plants retained about twice the weight of particles retained under damp conditions. However, it was also stated that the deposits occurring under damp conditions usually took place during the night when the wind speeds were low and the deposits occurring under dry conditions took place during the daytime when the wind speeds were higher. Thus, while the data indicate the factor of two in retention for damp conditions over dry conditions, the role of the wind speed in this difference is implicated.

The original intent of the measurements of the surface wind speeds and the measurements of the particle sizes by sieving was to provide data for estimating the particle trajectory angles. However, because of the high degree of agglomeration of the particles, as revealed by the plate collector data,* the sieving data were not suitable for this purpose. Instead, a few measurements of the trajectory angles with the

---

* See Carl F. Miller, The Impaction of Airborne Particles on Plate Collectors, Stanford Research Institute, Project No. MU-6358, April 1967.

Preceding Page Blank

plate collector coincident with collections of foliar samples provided some data for use as the initial starting point in estimating the values of the equation parameters as well as the trajectory angles when applied to the foliar retention equations presented in the Background section. Repetitive analyses for both the equation parameters and trajectory angles were carried out for the primary samples from all plants. This procedure was an extremely severe test of the general consistency of the data since it was required that a suitable functional form be found for representing the observed data and that the equation constants be evaluated numerically. In addition, the value of a major independent variable had to be deduced.

The eight sets of plate collector measurements coincident with collections of foliar samples, the derived trajectory angle, φ, and the primary foliar sample numbers whose particle deposit corresponded approximately (or exactly) with that for the plate collector are listed in Table 14.

In the initial step of the analysis, all the F_L values were reduced to unit planting and foliar surface density using the various assumed applicable equations according to the manner in which the fractions retained depended on these two variables and by defining the reduced F_L value by

$$F(\varphi) = \frac{F_L}{(n_p/xy)^{1/3} w_L^{2/3}} \qquad (84)$$

for those cases where F_L was indicated to be proportional to $(n_p/xy)^{1/3} w_L^{2/3}$. In other cases, such as for single horizontal leaves, $F(\varphi)$ is simply equal to a_L. The third repetitive estimates of φ and α, along with individual values of w_L and $F(\varphi)$, for all the primary samples of the vegetables, grasses, and cereal grains are given in Table 15. The derived particle trajectories for all sets of the primary foliar samples are summarized in Table 16. These values were back-calculated from the foliar contamination functions for each type of plant. A comparison between the average values of α (i.e., cot φ) taken from Table 16 and those computed from the d_{50} values from the sieve analysis of each tray sample, using the corrected wind speeds and the respective fall velocities of spherical particles of like density, is shown by the plot in Figure 6. Only in a few cases do the values of $\bar{v}_w/\bar{v}_f(50)$ fall near or below the ideal correlation line, as would be expected for discrete unagglomerated particles. On the average, the values of $\bar{v}_f(50)$ are about a factor of two smaller than required for ideal correlation;

this amount is more than could be accounted for by an error in the densities used in the computation of the falling velocities.

One rather important variable was not measured in the field experiments: the surface wind direction. While the personal observations at the two land plots in the second phase of the field work would indicate that the usual direction was 40 to 90 degrees from the line of the rows (i.e., from the north to northeast), the movements of the plate collector arms showed that short period fluctuations of 90 degrees on either side of the usual range in direction occurred in the daytime when the speeds were highest. At night, when most of the deposits took place, other directions than the usual north to northeasterly direction would be more likely than in the daytime. For the grain plots, the direction of the wind would have no effect on the particle retention. For other plants, the effect would be more important for plants that are more closely spaced in the rows than the spacing between rows (e.g., onion and radish). Therefore, when lower than usual values of $F(\varphi)$ occurred, it was not possible to determine whether the low value was due to the in-row spacing (Equations 15 through 17) or to statistical or measurement error. On the basis of personal observation of the direction of the wind during the daytime and of the side of the fence posts and other objects at Plot No. 1 and the camphor tree at Plot No. 2 having the highest level contamination, the average angle between the rows and direction of the wind was 65 ± 25 degrees ($\sin \bar{\delta} = 0.91$; $\cos \bar{\delta} = 0.42$).

Because of change in both equation form for representing the foliar contamination data and their range of application, the equations containing the derived average value of the constants for each plant type are given below as part of the text. In all equations, n_p is the number of plants, stalks, or heads in the area, xy; xy is in sq ft; w_L is the gm of dry plant per sq ft; φ and θ are in degrees; and $\bar{v}_w$ is in mi per hr.

1. Bean

$$F_L = 0.137 w_L e^{-0.126 \bar{v}_w}, \text{ bush and pole, dry, } w_L \le 0.5^{*} \quad (85)$$

* All w_L limits are approximate (where not given, equation is assumed to apply to all values of w_L).

$$F_L = 0.208 w_L e^{-0.396\bar{v}_w}, \text{ bush and pole, damp, } w_L \leq 0.5 \quad (86)$$

$$F_L = 0.0160\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin \varphi)}{\sin \varphi} e^{-0.111\bar{v}_w}, \text{ bush, dry, } w_L \geq 0.5 \quad (87)$$

$$F_L = 0.0316\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin \varphi)}{\sin \varphi} e^{-0.111\bar{v}_w}, \text{ bush, damp, } w_L \geq 0.5 \quad (88)$$

$$F_L = 0.0308\alpha e^{-0.051\bar{v}_w}, \text{ pole, dry and damp, } w_L \geq 0.5 \quad (89)$$

2. Bean Pods

$$F_f = 0.00351\left(\frac{n_f n_p}{xy}\right)^{1/3} w_f^{2/3} \alpha e^{-0.259\bar{v}_w}, \text{ dry and damp} \quad (90)$$

symbols F_f for the fraction retained and w_f for the surface dens re used for several of the fruits and pods. The contamination model for the bean pods assumes that the pods are in the shape of a long thin cylinder and that the axis of the cylinder is vertical to the ground surface. In addition, it is assumed that the major portion of the pods is exposed to direct impaction of the falling particles. Partial shielding by the leaves at all angles of impaction would be accounted for by the equation coefficient, η, and its dependence on wind speed. The term n_f is the average number of fruits or pods per plant; after about 50 days, the value of n_f for both the bush and pole beans averaged 7.5 pods per plant. It should be noted that, in equations such as 87, 88, and 90, the quantities $(n_p/xy)^{1/3} w_L^{2/3}$ and $(n_f n_p/xy)^{1/3} w_f^{2/3}$ can be replaced by $(n_p/xy) m_p^{2/3}$ and $(n_f n_p/xy) m_f^{2/3}$, respectively, where m_p is the dry weight per plant and m_f is the dry weight per fruit or pod.

3. Beet

$$F_L = 0.0390\left(\frac{n_p}{xy}\right)^{1/3} w_L \frac{(1 + \sin \varphi)}{\sin \varphi} e^{-0.218\bar{v}_w}, \text{ dry and damp} \quad (91)$$

4. Cabbage

$$F_L = 0.0517 w_L e^{-0.200\bar{v}_w}, \quad \alpha < 0.7, \text{ dry}, \; w_L \leq 1.0 \qquad (92)$$

$$F_L = 0.0738 w_L \alpha e^{-0.200\bar{v}_w}, \quad \alpha \geq 0.7, \text{ dry}, \; w_L \leq 1.0 \qquad (93)$$

$$F_L = 0.101 w_L e^{-0.200\bar{v}_w}, \quad \alpha < 0.7, \text{ dry}, \; w_L \leq 1.0 \qquad (94)$$

$$F_L = 0.144 w_L \alpha e^{-0.200\bar{v}_w}, \quad \alpha \geq 0.7, \text{ dry}, \; w_L \leq 1.0 \qquad (95)$$

$$F_L = 0.0133\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin\varphi)}{\sin\varphi}, \text{ dry}, \; w_L \geq 1.0 \qquad (96)$$

$$F_L = 0.0462\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin\varphi)}{\sin\varphi}, \text{ damp}, \; w_L \geq 1.0 \qquad (97)$$

The change in equation form at α of 0.7 indicates an apparent change in configuration for retention at an angle of about 55 degrees for the smaller leafy plants; at the steeper angles of fall, or smaller values of α, the projected area of all the leaves must be almost constant. No effect of wind speed on η is indicated for the headed cabbage (Equations 96 and 97) apparently because of the general rigidity of the thick leaves and head. The average deviation in the constant is 24 percent. Under dry conditions, about 10 percent of the total retained was on the surface of the cabbage head; under damp conditions, about 25 percent of the total retained was on the surface of the cabbage head.

5. Carrot

$$F_L = 0.0242\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin\varphi)}{\sin\varphi} e^{-0.368\bar{v}_w}, \text{ dry} \qquad (98)$$

$$F_L = 0.0525\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin \varphi)}{\sin \varphi} e^{-0.299\bar{v}_w}, \text{ damp} \tag{99}$$

6. Corn

$$F_L = 0.0885(3.410 - \alpha)e^{-0.203\bar{v}_w}, \quad \alpha < 2.492, \text{ dry}, \ w_L \le 1.0 \tag{100}$$

$$F_L = 0.170(\alpha - 2.013)e^{-0.203\bar{v}_w}, \quad \alpha \ge 2.492, \text{ dry}, \ w_L \le 1.0 \tag{101}$$

$$F_L = 0.0392(6.899 - \alpha)e^{-0.203\bar{v}_w}, \quad \alpha < 2.355, \text{ damp}, \ w_L \le 1.0 \tag{102}$$

$$F_L = 0.166(\alpha - 1.282)e^{-0.203\bar{v}_w}, \quad \alpha \ge 2.355, \text{ damp}, \ w_L \le 1.0 \tag{103}$$

$$F_L = 0.246(2.823 - \alpha)e^{-0.237\bar{v}_w}, \quad \alpha < 2.492, \text{ dry}, \ w_L > 1.0 \tag{104}$$

$$F_L = 0.170(\alpha - 2.013)e^{-0.237\bar{v}_w}, \quad \alpha \ge 2.492, \text{ dry}, \ w_L > 1.0 \tag{105}$$

$$F_L = 0.173(1.624 - \alpha)e^{-0.119\bar{v}_w}, \quad \alpha < 1.442, \text{ damp}, \ w_L > 1.0 \tag{106}$$

$$F_L = 0.197(\alpha - 1.282)e^{-0.119\bar{v}_w}, \quad \alpha \ge 1.442, \text{ damp}, \ w_L > 1.0 \tag{107}$$

$$F_L = 0.0174(\alpha + 0.5158), \text{ dry}, \ w_L \ge 10^{*} \tag{108}$$

$$F_L = 0.0372(\alpha + 0.5158), \text{ damp}, \ w_L \ge 10^{*} \tag{109}$$

---

* Corn plants with tassels and ears; data were not sufficient in quantity to determine whether η depends on the wind speed.

The form of the foliar contamination scaling equations for the corn was derived separately and only indirectly corresponds to the geometric forms discussed in the Background section. The basic model consists of a combination of cylindrical stems and an assumed spatial density of random leaves. For the smaller corn plants, the cone of leaves at the top of the plant was taken as being equivalent to a horizontal collector with a diameter proportional to the stem diameter. When all linear dimensions were assumed to scale as the cube root of the plant weight and the η values for all plant parts were assumed to be equal, the following general equation for F_L was obtained:

$$F_L = \eta\left(\frac{n_p}{xy}\right)^{1/3}\left(\frac{w_L}{\rho\pi\kappa_0}\right)^{2/3}(A + B\alpha) \qquad (110)$$

where

$$A = \pi + \frac{(\kappa_0\kappa_1 - \rho_s)}{\rho_\ell\kappa_1}\kappa_4\cos\theta \qquad (111)$$

$$B = \frac{2}{\kappa_1} - \frac{(\kappa_0\kappa_1 - \rho_s)}{\rho_\ell\kappa_4}\kappa_4\sin\theta \qquad (112)$$

$$w_L = \left(\frac{n_p}{xy}\right)\kappa_0 a^3 \qquad (113)$$

$$a = \kappa_1 z = \kappa_2 c = \kappa_3 d = \kappa_4 h \qquad (114)$$

and

$$\kappa_0 = \frac{n_\ell\rho_\ell\kappa_1 + \rho_s\kappa_2\kappa_3\kappa_4}{\kappa_1\kappa_2\kappa_3\kappa_4} \qquad (115)$$

in which a is the radius of the stem, z is the average stem length, c is the average leaf length, d is the average leaf width, h is the average leaf thickness, ρ_s is the average leaf density, ρ_ℓ is the average leaf

spatial density, and θ is a characteristic angle of the leaves with respect to retention of the particles. If such an angle exists, a minimum in F_L will occur when φ is equal to θ; in the equation, the leaves are not assumed to be horizontal, and the angle θ could apply to the direction across the leaves as well as to the direction along the length of the leaves. In a more gross sense, it is the incident angle at which the leaves would pass the maximum amount of sunlight to the ground. The constant A includes the quantity, π, representing the relative amount of particles collected in the cone of leaves at the top of the stem. The relative amount collected on the stems is represented by the term $2/\kappa_1$ in constant B. For the larger plants with tassels and ears, the quantity π in the constant B is eliminated, and, where the relative amount of particles collected by the stem is small compared with that collected by the leaves, as is the case for damp deposit conditions (see below), the characteristic angle θ can be evaluated from the constants A and B. On this basis, the value of θ is about 22 degrees for the corn before tasseling for deposits under dry conditions and varies from 23 to 35 degrees under damp conditions. For the taller corn with tassels and more dense foliage, the characteristic angle is about 117 degrees for the few sets of such samples.

The distribution of the weight of retained particles among the leaves, stem or stalk, ear, and tassel was measured on only a few samples. From these few data, it appears that this distribution depends strongly on the deposit conditions. Under dry conditions where the wind speed is usually the highest, the fraction of the total retained that is found on the leaves appears to depend more on the wind speed than on the particle trajectory angle. Under damp conditions where the wind speed is lowest, the relative amount of particles retained by the leaves appears to depend only on the particle trajectory angle. For any wind speed or trajectory angle, the relative amount retained by the leaves under damp conditions is higher than under dry conditions. The relative amount retained by the tassel appears to depend only on trajectory angle, perhaps because of its tacky surface characteristics. Estimates of the relative amounts retained by the corn leaves and tassel can be made from the following scaling functions:

$$F_L(\text{leaves}) = 0.435 F_L e^{-0.246\bar{v}_w}, \text{ dry} \tag{116}$$

$$F_L(\text{leaves}) = (1.00 - 0.0791\alpha) F_L, \text{ damp} \tag{117}$$

and

$$F_L(\text{tassel}) = 0.0364\alpha F_L, \text{ dry and damp} \qquad (118)$$

where F_L is given by Equations 104 through 109. For usual conditions of wind speed and trajectory angles, less than 20 percent of the particles retained by the plants is on the leaves under dry conditions and more than 80 percent is on the leaves under damp conditions.

7. Barley Grass

$$F_L = 0.0266 w_L(\alpha + 1)e^{-0.118\bar{v}_w}, \text{ dry and damp} \qquad (119)$$

8. Oat Grass

$$F_L = 0.0177 w_L(\alpha + 1)e^{-0.118\bar{v}_w}, \text{ dry and damp} \qquad (120)$$

9. Rye Grass

$$F_L = 0.0160 w_L(\alpha + 1), \text{ dry and damp} \qquad (121)$$

10. Wheat Grass

$$F_L = 0.0259 w_L(\alpha + 1)e^{-0.118\bar{v}_w}, \text{ dry and damp} \qquad (122)$$

For coarse grasses, the average value of the scaling equation constant, 0.0234, could be used. Some degree of the effect of leaf surface roughness may be included in these data since the oats has a slightly smoother surface than either the barley or wheat and, on the average, retains a smaller amount of particles for given values of w_L, α, and $\bar{v}_w$.

11. Lettuce

$$F_L = 0.0232\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin \varphi)}{\sin \varphi}, \text{ dry} \tag{123}$$

$$F_L = 0.0402\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin \varphi)}{\sin \varphi}, \text{ damp} \tag{124}$$

12. Onion

$$F_L = 0.0190\left(\frac{n_p}{xy}\right)^{1/5} w_L^{4/5} \alpha e^{-0.324\bar{v}_w}, \text{ dry and damp} \tag{125}$$

13. Pea

$$F_L = 0.0442\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3}(\alpha + 0.5800)e^{-0.226\bar{v}_w} \tag{126}$$

$$F_L = 0.0263\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3}(\alpha + 0.5800)e^{-0.226\bar{v}_w} \tag{127}$$

The pea is the only plant type having consistently lower values of F_L under damp conditions than under dry conditions at a given value of w_L, α, and $\bar{v}_w$. Evidently the surface characteristics of the leaf are the cause, at least indirectly. With heavy dew formation, the hydrophobic (nonwettable) leaves cause the dew to form water drops that, together with the trapped particles, roll off the leaves as soon as the drops become sufficiently large; a slight breeze assists in this decontamination process.

14. Pea Pods

$$F_f = 0.00336\left(\frac{n_f n_p}{xy}\right)^{1/3} w_f^{2/3} \alpha e^{-0.259\bar{v}_w}, \text{ dry} \tag{128}$$

$$F_f = 0.00199\left(\frac{n_f n_p}{xy}\right)^{1/3} w_f^{2/3} \alpha e^{-0.259\bar{v}_w}, \text{ damp} \quad (129)$$

The contamination model for the pea pods is almost identical to that described for the bean pods. The only difference is that the pods were assumed to have a thin elliptically shaped cross section rather than a spherical cross section. The average number of pods per plant for the samples taken in the field was 7.5. For a single pair of samples, the coefficient of the scaling equation for protected pods was 0.53 of that for exposed pods. Other sets of samples were for pods taken at random locations on the vines. Thus, the equations refer to an average exposure geometry where most pods are exposed to direct impact of the airborne particles.

15. Pepper

$$F_L = 0.150 w_L e^{-0.346\bar{v}_w}, \text{ dry, } w_L \leq 0.7 \quad (130)$$

$$F_L = 0.203 w_L e^{-0.085\bar{v}_w}, \text{ damp, } w_L \leq 0.7 \quad (131)$$

$$F_L = 0.0266\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{e^{-0.346\bar{v}_w}}{\sin \varphi}, \text{ dry, } w_L > 0.7 \quad (132)$$

$$F_L = 0.0266\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{e^{-0.085\bar{v}_w}}{\sin \varphi}, \text{ damp, } w_L > 0.7 \quad (133)$$

16. Potato

$$F_L = 0.124\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin \varphi)}{\sin \varphi} e^{-0.331\bar{v}_w}, \text{ dry} \quad (134)$$

$$F_L = 0.124\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin \varphi)}{\sin \varphi} e^{-0.275\bar{v}_w}, \text{ damp} \quad (135)$$

17. Radish

$$F_L = 0.119\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin\varphi)}{\sin\varphi} e^{-0.321\bar{v}_w}, \text{ dry and damp} \tag{136}$$

18. Squash (Zucchini)

$$F_L = 0.0710\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin\varphi)}{\sin\varphi} e^{-0.150\bar{v}_w}, \text{ dry and damp} \tag{137}$$

Most of the foliar samples of squash consisted of only one, two, or three of the most exposed near-horizontal leaves. For these leaf samples, treated as a single leaf in model form, the values of F_L are somewhat inaccurate because the number of such leaves per unit area is not well known. However, the correlation of the contamination factors by means of Equations 13 and 14 is valid and, for the observed data, leads to

$$a_L = 0.210 \frac{\sin(\theta - \varphi)}{\sin\varphi} e^{-0.165\bar{v}_w}, \text{ dry} \tag{138}$$

and

$$a_L = 0.210 \frac{\sin(\theta - \varphi)}{\sin\varphi} e^{-0.132\bar{v}_w}, \text{ damp} \tag{139}$$

where θ is the average angle of the plane of the leaf from the horizontal in the direction of the wind. The computed values of θ for the various leaf samples are listed in Table 17.

19. Squash (Zucchini) Fruit

$$F_f = 0.0122\left(\frac{n_f n_p}{xy}\right) w_f^{2/3} \frac{(1 - F_L \sin\varphi)}{\sin\varphi}, \text{ dry and damp} \tag{140}$$

The value F_L in Equation 140 is that given by Equation 137. In writing the form of Equation 140, it was assumed that the fruits were in

the form of cylinders lying on the ground, or near to it, under the leaf canopy and that the fruit would be contaminated only by the particles drifting past the leaves and into the canopy where they could fall on the fruit at much larger angles than φ. Thus, the term $(1 - F_L \sin \varphi)$ in Equation 140 is proportional to the particle flux under the leaf canopy. The average value of n_f is approximated by 0.09(t - 55) fruit per plant, where t is the number of days after planting; the relation applies to t values between about 80 and 150.

20. Squash (Zucchini) Flowers

$$F_L = 0.0267 \tag{141}$$

The flowers were usually upright and exposed. They remained open for about one day. During the period of 55 to 150 days after planting, the number of flowers per plant on the sampled plants was about 2.5 (two to three); their average dry weight was 0.23 gm. The relatively large amount of particles collected by the open flowers apparently reduced the number of fruits and prolonged the blooming period.

21. Tomato

$$F_L = 0.0176\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{e^{-0.161\bar{v}_w}}{\sin \varphi}, \text{ dry, } w_L < 0.5 \tag{142}$$

$$F_L = 0.0380\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{e^{-0.161\bar{v}_w}}{\sin \varphi}, \text{ damp, } w_L < 0.5 \tag{143}$$

$$F_L = 0.0652\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \frac{(1 + \sin \varphi)}{\sin \varphi} e^{-0.161\bar{v}_w}, \text{ dry and damp, } w_L \geq 0.5 \tag{144}$$

22. Barley (Stalks)

$$F_L = 0.0181\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3}(1.729 - \alpha), \ \alpha < 1.344, \text{ dry and damp} \tag{145}$$

$$F_L = 0.00519\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3}\alpha, \quad \alpha \geq 1.344, \text{ dry and damp} \qquad (146)$$

23. Barley (Heads)

$$F_L = 0.00683\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3}\alpha e^{-0.191\bar{v}_w}, \text{ dry and damp} \qquad (147)$$

24. Oats (Stalks)

$$F_L = 0.0153\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3}(2.053 - \alpha), \quad \alpha < 1.544, \text{ dry and damp} \qquad (148)$$

$$F_L = 0.00503\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3}\alpha, \quad \alpha \geq 1.544, \text{ dry and damp} \qquad (149)$$

25. Oats (Heads)

$$F_L = 0.00531\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3}\alpha e^{-0.210\bar{v}_w}, \text{ dry and damp} \qquad (150)$$

26. Wheat (Stalks)

$$F_L = 0.0188\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3}(1.669 - \alpha), \quad \alpha < 1.334, \text{ dry and damp} \qquad (151)$$

$$F_L = 0.00472\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3}\alpha, \quad \alpha \geq 1.334, \text{ dry and damp} \qquad (152)$$

27. Wheat (Heads)

$$F_L = 0.00574\left(\frac{n_p}{xy}\right)^{1/3} w_L^{2/3} \alpha e^{-0.233\bar{v}_w}, \text{ dry and damp} \qquad (153)$$

Most of the foliar contamination data for the barley, oats, and wheat was obtained from foliage contaminated under damp conditions. However, the few samples from contamination under dry conditions are consistent with the other data, and, therefore, a single scaling function for both dry and damp is given for each type of grain and grain head. No significant dependence of η on wind speed is shown by the data for the grain stalks (i.e., stems, leaves, and heads). One possible reason is that the range in wind speeds for the sets of samples was not very large (highest wind speed was 5.6 mi per hr). Another is that the lower leaves tended to retain particles that were not retained by the heads and upper leaves at the higher wind speeds. The foliar contamination data for the rye were not processed because, as previously mentioned, the rye did not produce seed; but, because of the similarity in the particle retention by barley, oats, and wheat, it is expected that rye and other grains would also exhibit similar retention behavior.

The scaling functions for the grain stalks were derived on the same basis as those for the tasseled corn. The characteristic leaf angles are about 37 degrees for barley, 33 degrees for oats, and 31 degrees for wheat. The model for the heads giving the best fit to the data is the one developed for a cylindrically shaped object.

The variation of the contamination scaling function parameters with α or $\bar{v}_w$ for several of the different plant types is plotted in Figures 7 through 13. The plots show the general spread of the data points about the scaling function equations, as indicated by the lines drawn in the figures. The values of φ used to compute the angular functions are not those of Table 16 but the last previous iterative estimates of φ for the different sets of samples.

Foliar Contamination Weathering Functions

Reduction and analysis of the data on the effect of wind in removing particles from foliage after the initial deposit consisted mainly of the computation and summary of the k_w values (defined by Equation 79) given in Table 9. To derive a method for representing the effect of rain on the removal of particles from foliage, the Ψ_{wr} values

of Table 9 were analyzed for reduction to pure Ψ_r values as representative of reduction in particle concentrations on the foliage by rain without significant additional wind effects. Initially, for the cases where τ was relatively small (fresh deposit and little wind weathering) and the rainfall was 0.1 inch or greater, the Ψ_{wr} values were taken as Ψ_r values on the assumption that the rain would have removed all the particles previously removed by the wind. In some cases, the last previous measured value of Ψ_w was taken as the reference level of contamination; finally, where τ was known up to the time of rainfall, Ψ_w was estimated to that time to determine the degree of wind weathering. The acceptance or rejection of these reference values for calculating Ψ_r depended on their general agreement with the Ψ_r values obtained under the above given basic assumption about the effect of rain. The reduced values of Ψ_r for the rain-weathered foliar samples thus obtained are given in Table 18.

Inspection of the data in Table 18 shows that Ψ_r decreases with inches of rainfall (one or more consecutive showers without a drying period between showers) more rapidly than 1/R, where R represents the amount of rainfall. The data were therefore correlated to fit a function of the form

$$\Psi_r = \frac{\Psi_r^o e^{-k_r R}}{R} \tag{154}$$

in which Ψ_r^o and k_r are constants that depend mainly on plant type or form and only to a minor degree on plant size. To evaluate the constants of Equation 154 for many of the vegetable plants, the weathering data from pot-grown plants had to be utilized because of the splashing up of soil particles onto the leaves of the field-grown plants (see notes in Table 18).

The degree of fit of Equation 154 to the rain weathering of particles from grasses and tree leaves and from cereal grains is shown by the plotted data in Figures 14 and 15, respectively. The spread in the data is consistent with that of the other field measurements. The computed values of Ψ_r^o for the various derived and selected values of k_r are given in Table 19. One set of data in the table indicates that the Ψ_r^o values for the samples where a small deposit occurred at the start of rainfall are considerably lower than for the other samples. The average value of the ratio between the two, Ψ_r^o(deposit with rain)/Ψ_r^o(rain after deposit), is 0.27. The value of k_r appears to depend on both plant size and leaf surface characteristics (smoothness, presence of fibers or

hair, and wettability). The values of k_r are higher for the headed grains than for the grains in grass form; the value of k_r is higher for cabbage (smooth nonwettable leaves) than for geranium and poppy (hairs or fibers on the leaf surface).

The average values of all the weathering equation parameters and their respective relative average deviations are summarized in Table 20 for all the plants on which measurements were made. In preliminary and partial treatments of the weathering data, it appeared that the particle removal was more rapid and thorough when the initial deposit occurred under dry conditions than when it occurred under damp conditions. However, when all the data were assembled, this apparent influence of initial conditions on the values of the various equation coefficients disappeared in the general spread of their derived values. Thus, while the data indicate that initial conditions do not cause differences as large as or larger than an order of magnitude in the scaling equation parameters, some degree of influence is not ruled out since the data and the average values of the parameters are biased by the preponderance of data obtained from samples that were initially contaminated under damp conditions.

It may be noted from the data in Table 9 that consistently high or low values of k_w, for example, are obtained in different weathering sequences. It is established, however, that the wind weathering of old deposits is much slower than that of fresh deposits (either dry or damp). The old deposits to which the data apply were for the weathering that followed a set of secondary samples (partially weathered at the time of sampling). The original secondary samples resulted from an exposure of washed foliage for a period of two days over which intermittent light particle showers occurred under damp conditions both day and night (mist-laden air moved over the field most of the day). The following weathering period under similar conditions was three days long with essentially no additional deposit during the weathering period. Thus, part of the deposits had passed through five days of heavy dew condensations at night and drying-off periods in the morning up to sampling time. However, because of the extremely low degree of weathering, the deposit must already have encrusted on the leaves at the end of the first two days of exposure. In the cited case, where τ was 724 miles, 0.03 inch of rain at the end of the wind-weathering sequence was not effective in washing off the residual deposit.

The values of C^o_{PNR} given in Table 20 were taken from the background measurements of the spray-washed foliage and are suggested as being the best available estimates of the particle concentrations that could not be further reduced by any degree of wind- or rain-weathering. However,

if foliage is already loaded to these levels with inactive dust before the arrival of fallout, the nonremovable fraction could be less than would be estimated from the C^{o}_{PNR} values of Table 20.

Examples of the manner in which the k_w values are distributed are shown by the plots in Figures 16 and 17. It is readily evident from these plots and from the data of Table 20 that the bulk of the k_w values for all plants fall in the range of 0.01 to 0.1 mi^{-1}. Except for the taller plants with the more vertically oriented leaves (which have the higher k_w values), most average k_w values are between 0.02 and 0.04 (see averages at bottom of Table 20). Until further evidence is obtained, the average values of the weathering equation parameters are assumed to apply to fresh particle deposits occurring under both dry and damp conditions.

Variation of Plant and Plant Part Dry Weights with Plant Age

For nuclear war damage assessments of the effects of fallout on plants, estimates of the foliar surface density, w_L, are needed for computing the F_L values as a direct input parameter. The value of w_L, in turn, depends on the planting density, n_p/xy, and the dry plant weight, m_p, by the simple relationship

$$w_L = \left(\frac{n_p}{xy}\right) m_p \qquad (155)$$

The plant weight depends on plant age. And, since the planting dates for most crops are well known for each county or region over the country, the ages of various crops in each county can be estimated once the attack date for a hypothetical war is selected.

A generalized formulation for the variation of m_p with plant age is presented below together with analysis of the data obtained in Costa Rica. Because of the special soils and climate in Costa Rica, the results of the analysis may not be directly applicable to conditions in other locations due to differences in soils, climate, and farm management practices. The treatment of other data by similar methods would be needed to supply the needed input information.

Without special reference to details of biological processes (somewhat in the same sense that, without reference to specific processes, it is generally conceived that the entropy of the universe is constantly increasing), it is postulated that, within a given growth cycle, the

biological activity decelerates at a constant rate. This statement may be written very simply as

$$d^2y/dt^2 = -2a_T \qquad (156)$$

where y represents some measurable quantity of biological activity and a_T is a constant (which, depending on its role, may be called a characteristic biological activity coefficient or a termination coefficient). The first integration of Equation 156 gives

$$dy/dt = 2a_T t + C_T \qquad (157)$$

where C_T is an integration constant. The constant C_T may be evaluated in terms of other parameters of interest; here, C_T is evaluated by setting dy/dt equal to zero at the time, t_m, where either a maximum or minimum in biological activity occurs (t_m could thus be referred to as the time of mortality or the time of maximum growth; the latter definition applies to the present treatment). With this evaluation, Equation 157 becomes

$$dy/dt = 2a_T(t_m - t) \qquad (158)$$

To obtain the solution of Equation 158 that best represents the measured plant weight data, the biological activity change indicator, dy, is replaced by dm_p/m_p, the fractional change in the dry weight of the plant (the dry weight being proportional to the minerals and organic matter accumulated in the aboveground parts of the plant). Integration of Equation 158 with this substitution for dy and application of the limiting condition that m_p is equal to m_p^o at t_m gives

$$m_p = m_p^o e^{-a_T(t_m - t)^2} \qquad (159)$$

where m_p is the total dry weight of the aboveground plant, including stems and fruit, and m_p^o is the maximum plant dry weight. Alternative solutions of Equation 156 can be obtained by varying the values of the integration constants or by changing the limits of integration. Thus, for the case where C_T of Equation 157 is zero to represent growth of a

plant part that has zero rate of change at t equal to zero, substitution of dm_f/m_f for dy gives

$$\frac{dm_f/m_f}{dt} = -2\alpha_\tau t \qquad (160)$$

where m_f represents the fruit dry weight. With application of the operator $A_\tau e^{-a_\tau t^2}$, Equation 160 can be rewritten as

$$\frac{dm_f}{dt} = -2\alpha_\tau t A_\tau e^{-a_\tau t^2} \qquad (161)$$

where A_τ is an integration constant. Taking A_τ equal to $m_o e^{a_\tau t_o^2}$ and integrating Equation 161 from the limit of $m_f = 0$ when $t = t_o$ gives

$$m_f = m_f^o\left[1 - e^{-a_\tau(t^2 - t_o^2)}\right] \qquad (162)$$

The form of Equation 162 may be used to represent the growth or increase in weight of fruits or seeds or, rather, the increase in the weight of fruits and seeds with time after their appearance at t_o. Both Equations 159 and 162 may be tested for their fit to the plant growth data. However, because most plants show a slight decrease in dry weight near the end of their growth cycle, Equation 159 only was used to correlate the m_p data (most plants tend to return some minerals back to the root zone after maturity).

The values of the plant growth equation parameters are given in Table 21 as derived from the averaged m_p values of Table 11.* The data for several of the vegetables and cereal grains are plotted in Figures 18, 19, 20, and 21. Within the limits of variability in the data (see Table 11), the fit of Equation 159 to the data is exceptionally good. Also, the general consistency among the derived values of a_τ for all the plant types is somewhat surprising in view of general dispersion of the weights of the individual plants. For many of the

---

* An alternative way of writing Equation 159 is $m_o' e^{At - Bt^2}$, where m_o' is equal to $m_p^o e^{-a_\tau t_m^2}$, A is equal to $2t_m$, and B is equal to a_τ.

plants, the value of t_m for the plants grown during the rainy season in Costa Rica is quite large compared with that for plants grown where the climate is more suitable for good growth. Discontinuities in the data are noted to be coincident with those periods when the amount of sunshine hours was small and when mildew and insect attacks were severe. The data for the wheat stalks show the relatively faster development of the Colombian experimental wheat variety over the U.S. variety obtained through the U.S. Department of Agriculture.

The derived values of the seed formation equation parameters for the cereal grains are given in Table 22; the data are plotted as a function of time after planting in Figure 22. These data also reveal the varietal differences in the development of the wheat heads where t_o for the Colombian wheat is 37 days compared with 68 days for the U.S. wheat variety. (Some of this difference is probably due to climatic differences, since the Colombian wheat was planted near the end of the rainy season and matured in the dry season whereas the U.S. variety was planted and grown to maturity in the rainy season.) None of the other crops were grown to harvest of ripened seeds so that conformance of Equation 162 to the formation of seeds or ripened fruit for the vegetables could not be evaluated.

Correlation Analysis of Plant Part Projected Area and Dry Weight Data

Since all the projected area measurements for leaves indicated that the projected area was not directly proportional to the dry weights, the deviation from direct proportionality was investigated by fitting the specific area data to an equation of the form

$$S_L = S_L^o m_L^{-n_L} \tag{163}$$

in which S_L^o and n_L are empirical constants, m_L is the dry weight per leaf (or plant part), and S_L is the specific area in sq ft per gm (dry weight).

The use of the parameter S_L as an input to the basic foliar contamination relationship for single leaves or plant parts is evident from the discussions in Part One and Part Two, providing a means for converting the leaf weight data to leaf area data. In addition, the correlation coefficients of Equation 163 are related to several of the foliar contamination functions discussed in the Background section in

this part of the report. For an elliptically shaped leaf of thickness h and density ρ, the specific area is given by

$$S_L = 1/\rho h \tag{164}$$

Thus, if ρ and h are constant for all leaves, S_L is also constant. The value of S_L can depend on m_L if either ρ or h changes with leaf size. If all dimensions of the leaf vary linearly with leaf size (i.e., $b = \kappa_1 a$ and $h = \kappa_2 a$, where a and b are the two axes of the elliptical leaf), the specific area for a constant density would be given by

$$S_L = \frac{(\pi\kappa_1)^{1/3}}{(\rho\kappa_2)^{2/3}} m_L^{-1/3} \tag{165}$$

where S_L is inversely proportional to the cube root of the leaf weight. Alternative possibilities are as follows:

1. $b = \kappa_1 a$, $h = \kappa_3 a^2$; $n_L = 0.50$
2. $b = \kappa_4 a^2$, $h = \kappa_3 a^2$; $n_L = 0.40$
3. $b = \kappa_4 a^2$, $h = \kappa_2 a$; $n_L = 0.20$

If ρ increases as the leaf size increases with age, n_L could have any value less than unity.

For a spherically shaped object of constant density, such as a fruit, the specific area would be given by

$$S_L = \frac{3}{4}\left(\frac{4\pi\rho}{3}\right)^{1/3} m^{-1/3} \tag{166}$$

For a cylindrically shaped object of constant density, such as a stem, wheat head, or squash (zucchini) fruit of length ℓ and radius a, the specific area is given by

$$S_L = \frac{2}{\pi\rho a} \tag{167}$$

The following values of n_L are possible, depending on the relative degree of change in l and a as the cylindrically shaped object grows in size:

1. $l = \kappa_0$, $n_L = 0.50$
2. $l = \kappa_1 a$, $n_L = 0.33$
3. $l = \kappa_2 a^2$, $n_L = 0.25$
4. $l = \kappa_3 a^3$, $n_L = 0.20$
5. $l = \kappa_4 a^{-1}$, $n_L = 1.00$
6. $l = \kappa_5 a^{-2}$, $n_L = 0.00$
7. $l = \kappa_6 a^{-3}$, $n_L = -1.00$

The evaluated correlation equation coefficients are summarized in Table 23 for the various plant leaves and other plant parts. Unfortunately, no leaf density measurements were made but the difference in the correlation parameter, S_L^o, for young and old plants and leaves is a strong indication that the density increases as the leaf ages. For most of the vegetables, the derived value of n_L for the leaves is between 0.25 and 0.33, suggesting perhaps that the leaf dimensions vary linearly with leaf size, with some increase in density for the larger and older leaves. The relatively smaller value of n_L for the tree leaves suggests that the leaf thickness is about the same for all leaves and that only the density increases.

The value of n_L of 0.20 for onions corresponds exactly to the case where, for a constant density cylinder, the length of the stem increases in proportion to the third power of the radius. This scaling was selected in the analysis of the foliar contamination data for onions.

The variation of S_L with m_L for the leaves of the cabbage plant and the leaves of the avocado, grapefruit, and laurel trees is shown respectively in Figures 23, 24, 25, and 26.

Tree Contamination Functions

The data on the contamination of the leaves of trees were not very extensive, especially with respect to information on the total loading of the trees with particles. Only for the small grapefruit tree was a

reliable measurement of the total leaf weight made. For this tree, a record of the locations of the leaves removed as samples was made with the intention of establishing the angular orientations of the individual leaves and using this information to derive the particle trajectory angles and modeling information. However, the analysis of the photographic data proved to be exceedingly tedious and time-consuming and was discontinued. In any event, the amount of detail in the analysis could not be employed in damage assessments because the input data would not be available for other trees and because the computation time would be prohibitive.

The approach in the development of the tree contamination function parallels that for the other plants as discussed in the Background section. However, instead of being interested in the fraction of the ground-level deposit retained by the tree leaves, the functions are concerned with the total weight of particles retained by single trees. (The conversion to fractions retained relative to the ground surface without the presence of the trees for a forest stand is easily accomplished from the functions given in the Background section once the equation parameters are known.) The characteristic tree canopy shapes selected for modeling are (1) an elliptical shape, (2) a spherical shape, and (3) a half-elliptical shape. (The latter applies to a large pine tree.) The generalized tree contamination function is

$$\Delta M_t = \eta S_L(s,\varphi)\Delta m_o \tag{168}$$

where ΔM_t is the total weight of particles retained by the tree leaves, η is the impaction-retention or screening coefficient, $S_L(s,\varphi)$ is a function that relates the tree dimensions and shape to its projected area and the particle fall angle, and Δm_o is the particle flux density (gm per sq ft) in a plane perpendicular to the particle fall trajectory for a given shower of particles. In general, Δm_o is known only through measurements of Δm on a horizontal surface in a nearby open area. Thus, Equation 168 becomes

$$\Delta M_t = \eta S_L(s,\varphi)\Delta m/\sin\varphi \tag{169}$$

If, for the selected canopy geometries, the letter a designates the radius for the spherical shapes and the (minor) axis of revolution in the horizontal plane for the elliptical shapes and b designates the major axis for the elliptical shapes, the specific functional forms are

$$\Delta M_t = \eta \pi a b \left[\sqrt{\frac{(1 + \alpha^2)[(a/b)^4 + \alpha^2]}{[(a/b)^2 + \alpha^2]}} \right] \Delta m \tag{170}$$

for the elliptically shaped canopy;

$$\Delta M_t = \frac{\eta \pi a}{2} \left[a + b \sqrt{\frac{(1 + \alpha^2)[(a/b)^4 + \alpha^2]}{[(a/b)^2 + \alpha^2]}} \right] \Delta m \tag{171}$$

for the half-elliptically shaped canopy; and

$$\Delta M_t = \frac{\eta \pi a^2 \Delta m}{\sin \varphi} \tag{172}$$

for the spherically shaped canopy.

Since no direct measurements of ΔM_t were made, the values of η were obtained by indirect methods. The geometric constants for the tree specimens used in the experiments were deduced from photographic evidence. Several other relationships can be written for ΔM_t; these include

$$\Delta M_t = W_L a_L \overline{\Delta m}(\text{eff}) \tag{173}$$

$$\Delta M_t = N_L \bar{m}_L a_L \overline{\Delta m}(\text{eff}) \tag{174}$$

and

$$\Delta M_t = \rho_L V_L a_L \overline{\Delta m}(\text{eff}) \tag{175}$$

where W_L is the total dry weight of the leaves, N_L is the number of leaves on the tree, $\bar{m}_L$ is the average dry weight of a leaf, ρ_L is the spatial density of the leaves, V_L is the total volume of the canopy, and $\overline{\Delta m}(\text{eff})$ is the effective value of Δm for the tree as a whole. In Part Two, the value of a_L was permitted to vary for samples around the canopy

through evaluation of the ratio $C_p^o/\Delta m$; here, a_L is taken to be an invariable coefficient for a given type of leaf and set of exposure conditions. The greased-disc collector data show that the air concentration of the particles within the tree canopy is decreased; thus, it follows that C_p^o of the interior and lower leaves is decreased because of the decrease in Δm with distance into the canopy from the outside leaves in the direction of the wind. Thus, the a_L value applicable to Equations 173 through 175 is that measured for the leaves on the top of the canopy and on the upper portion of the canopy facing the wind. (Specific orientation of the individual leaves is neglected assuming that a_L is an average value for a group of leaves in various orientations with respect to the average value of the particle trajectory angle.)

The values of the geometric and other characteristic tree canopy parameters for the tree specimens on which foliar contamination data were obtained are summarized in Table 24. The parameters a, b, h_t (height of top of canopy), and h_b (height of bottom of canopy) were derived from field photographs taken at two or more directions from the tree. In all cases, the projected areas of the canopies were measured and the dimensions a and b were evaluated from the area measurements to obtain better average values of these parameters and to check the general consistency of the selected geometric form for each tree. As previously stated, all the leaves of the grapefruit tree were removed from the tree, counted, dried, and weighed so that the values of $\bar{m}_L$, N_L, W_L, and ρ_L are accurately known for that specimen. The values of these parameters for the laurel tree were estimated from two branches that were removed from the tree; one branch carried 890 leaves and the other 592 leaves. The spatial volume of each of the leaf groups was determined from a trio of photographs taken of the branches while they were held in the same orientation as when on the tree. The average number of leaves per cu ft from the two measurements was 166 ± 10. The spatial density of the needles from Pine-2 was determined from the count of 220 needles per ft of branch, the needle length of 0.36 ft, and the average weight of 0.0675 gm per needle. This number of needles would yield a spatial density of 36.7 gm per cu ft around each of the branches for the last 2 to 3 ft of length. However, because the older wood on the branches has no needles and is spaced so that some of the canopy volume is void space, this calculated spatial density was reduced by a factor of two for the whole tree.

The consistency of the ρ_L values for the grapefruit, laurel, and Pine-2 suggests that the value of ρ_L is more nearly the same for all trees than is the number of leaves per unit volume. The number of leaves per cu ft, from the data of Table 24, is 69 for the avocado, 196 for the camphor, 66 for the grapefruit, and 166 for the laurel.

The reduced needle density for Pine-2 amounts to an average number of 270 needles per cu ft.

In Part Two, preliminary evaluations of $F(w_L)$ were made along with evaluations of the coefficient β in the equation

$$F(w_L) = e^{-\beta r} \tag{176}$$

where r is the path distance of particles that penetrated the canopy and were intercepted by the leaves located at some point in the canopy other than on the upwind side of a tree. If the reduction in Δm (or Δm_o) along this path is the cause of the reduction in C_p^o of the leaves, Equation 176 is related to $\overline{\Delta m}(eff)$ through

$$\overline{\Delta m}(eff) = \Delta m(1 - e^{-\beta r}) \tag{177}$$

and the particle flux within the canopy would be represented by

$$\Delta m(r) = \Delta m e^{-\beta r} \tag{178}$$

where $\Delta m(r)$ is the particle flux at the distance r from the outside leaves as measured along or parallel to the particle trajectory.

The application of Equations 177 and 178 depends on whether the particle trajectories are maintained to some degree after the particles enter the canopy. If the air within the canopy does not move through the canopy at all, the distance r should be the vertical distance from the point of particle entry into the canopy. If the air moves through the canopy with approximately the same speed as it does outside of the canopy, the outside particle trajectories will be approximately maintained for the particles penetrating the canopy. The latter case would be expected to prevail especially as the wind speed increases and forces the leaves into motion and to an average orientation that is less wind resistant. As a consequence, a relatively larger fraction of the incident particle flux should move through the canopy with increase in wind speed; in other words, the value of $\overline{\Delta m}(eff)$ should build up with path length inversely proportional to wind speed. On the other hand, $\overline{\Delta m}(eff)$ should build up with path length in proportion to the density of leaf area along the path or in direct proportion to ρ_L (leaf area is more nearly proportional to m_L than it is to the number of leaves).

The build-up rate of $\overline{\Delta m}(\mathrm{eff})$ along the path, with the aid of Equation 177, thus can be written as

$$\frac{d\overline{\Delta m}(\mathrm{eff})}{dr} = \frac{\beta^o \rho_L}{\bar{v}_w}\left[\Delta m_o - \overline{\Delta m}(\mathrm{eff})\right] \tag{179}$$

in which β^o is a constant whose value may be estimated from

$$\beta^o = \frac{\bar{v}_w \beta}{\rho_L} \tag{180}$$

Only very approximate evaluations of the parameter β or β^o and investigations of the persistence of the particle trajectory angles within the tree canopy were possible from the few data obtained from samples taken at various locations on the camphor, laurel, and pine tree canopies. Unfortunately, measurements of the wind direction during deposition were not made, and the direction had to be assumed or deduced from the contamination data (see discussion in Part Two). For the camphor tree, the direction of the wind was assumed to be from the northeast for all sets of samples. For the laurel tree, the wind directions were taken as follows: (1) Set No. 2, northeast; (2) Set No. 3, southeast; (3) Set No. 4, west; and (4) Set No. 5, west (see Table 19 of Part Two for a description of the sample sets). For the Pine-2 tree, two sets of peripheral foliage samples were taken at a height of about 6 ft above the bottom branches. In the first set (see Table 24 of Part Two), nine samples were taken, and the relative degree of contamination of the samples suggests that the direction of the wind during deposition was between 300 and 325 degrees from true north. In the second set, the wind direction was taken to be from the south.

If the usual x,y,z coordinate system (with origin at the midheight of the tree for the spherical and elliptical canopies and at the bottom of the canopy for the half-elliptical shape) is assumed for the specification of sampling locations within the canopies of the trees, the trajectory path (assumed to be a straight line in the x-z plane) may be defined by

$$x = \alpha(z - z_o) \tag{181}$$

where z_o is the intercept for a given trajectory at x equal to zero and where the x axis is parallel to the direction of the wind. The path length, r, for the spherically shaped canopy is

$$r = 2\sqrt{a^2 - y^2 - z_o^2 \cos^2 \varphi} \qquad (182)$$

For an elliptically shaped canopy, r would be estimated from

$$r = \frac{2ab}{a^2 + \alpha^2 b^2}\sqrt{(1 + \alpha^2)\left[(a^2 + \alpha^2 b^2)(1 - y^2/a^2) - \alpha^2 z_o^2\right]} \qquad (183)$$

For a half-elliptically shaped canopy, r would be estimated from Equation 183 for z_o values between $(a/\alpha)\sqrt{1 - y^2/a^2}$ and $(1/\alpha)\sqrt{a^2 - \alpha^2 b^2}$ and from

$$r = \frac{(1 + \alpha^2)^{1/2}}{(a^2 + \alpha^2 b^2)}\left[\alpha^2 b^2 z_o^2 + ab\sqrt{(a^2 + \alpha^2 b^2)(1 - y^2/a^2) - \alpha^2 z_o^2}\right] \qquad (184)$$

for z_o values between $-(a/\alpha)\sqrt{1 - y^2/a^2}$ and $(a/\alpha)\sqrt{1 - y^2/a^2}$.

Equations 181 and 182 were used to analyze the data from the camphor and laurel trees; for the data from Pine-2, Equations 181, 183, and 184 were used. The information used to calculate the β values and the resulting β values from the $F(w_L)$ data for the camphor and laurel trees is summarized in Table 25. The $C_p^o/\Delta m$ ratios from which the β values for the laurel tree were actually computed are plotted as a function of r in Figure 27. The $C_p^o/\Delta m$ ratios for the Pine-2 tree are plotted as a function of r in Figure 28; the derived β values are given in the figures as the slope of the lines. The rather large variation in the $C_p^o/\Delta m$ or a_L values for the samples taken from the sides of the trees directly exposed to the incoming particles could arise from either local shadowing of one group of leaves by the next (or by a branch) or from differences in the leaf orientations. The relatively high a_L values of the individual horizontal leaves taken from the periphery of the laurel tree in one experiment (see Figure 16 of Part Two) is an example of the latter.

The average value of β^o for the camphor and laurel trees is

$$\beta^o = 0.0612 \text{ (mi/hr)/(gm/sq ft)} \tag{185}$$

for $\bar{v}_w$ in mi per hr and ρ_L in gm per cu ft; if $\bar{v}_w$ is expressed in ft per sec, the value is

$$\beta^o = 0.0897 \text{ (ft/sec)/(gm/sq ft)} \tag{186}$$

For the pine tree, the average value of β^o is

$$\beta^o = 0.0376 \text{ (mi/hr)/(gm/sq ft)} \tag{187}$$

or

$$\beta^o = 0.0551 \text{ (ft/sec)/(gm/sq ft)} \tag{188}$$

where heavy weight was given to the data of Set No. 1. For Set No. 2, only single values of $C_p^o/\Delta m$ were obtained for the side of the tree directly exposed to the incoming particles, and the side locations were apparently not known within a sector of 30 degrees or more. The meristem contamination levels would be more susceptible to local shielding as single branch tips than would be the larger branch-section samples. In all the analyses, the true path length of the particles through the foliage is least well defined for the peripheral samples taken from locations at 90 degrees to the direction of the wind (i.e., where y approaches $\pm$ a). For both sets of data, the value of α was calculated from the ratio $\bar{v}_w/\bar{v}_f(50)$, in which the value of the falling velocity, $\bar{v}_f(50)$, was determined from d_{50} for the particles obtained through the sieving measurements.

The results of the analysis described above indicate, at least in a gross sense, a tendency for the particles to maintain their original trajectories within tree canopies with radii as large as 3 ft or more. This behavior is adapted as characteristic of the particles in further treatment of the data for evaluating the screening coefficient, η. Additional significance to be attached to the dilution of the particle air concentrations in passing through the trees is that the leaves on the windward side and tip of the tree will be the most highly contaminated.

The value of η can be evaluated through combination of a pair of ΔM_t functions such as, for example, Equations 172 and 173; this pair gives, for η

$$\eta = (W_L/\pi a^2)a_L \sin\varphi\left[\overline{\Delta m}(eff)/\Delta m\right] \tag{189}$$

To accomplish the evaluation of η through Equation 189, an estimate of the ratio $\overline{\Delta m}(eff)/\Delta m$ is needed. One method of evaluation would be through a random sampling of leaves throughout the whole canopy since, in this case, a gross average value of C_p^o or a_L is obtained and $\overline{a_L}(eff)\Delta m$ can be substituted for $a_L\overline{\Delta m}(eff)$. As previously stated, the a_L value applicable in this treatment refers to that of the leaves on the upwind side of the tree.

In general, the ratio $\overline{\Delta m}(eff)/\Delta m$ would be equal to the ratio of the total particle flux that does not leave the back side of the tree to the total flux over the projected area of the canopy in a plane perpendicular to the average particle trajectory (or fall vector). For a spherically shaped canopy, this ratio can be computed. The total particle flux that passes through the canopy to the back side of the tree is given by

$$\Delta M_r = 2\pi m_o \int_o^a e^{-\beta r} Y dY \tag{190}$$

where Y is the radius of the canopy in the x-z plane (x direction being parallel to the direction of the wind). The total incident flux is simply $\pi a^2 m_o$. Integration of Equation 190 yields

$$\Delta M_r = \frac{\pi m_o}{2\beta^2}\left[1 - (2a\beta + 1)e^{-2a\beta}\right] \tag{191}$$

And, since

$$\overline{\Delta m}(eff)/\Delta m = \frac{\pi a^2 m_o - \Delta M_r}{\pi a^2 m_o} \tag{192}$$

the ratio in terms of the parameter β and the canopy radius becomes

$$\overline{\Delta m}(eff)/\Delta m = 1 - \frac{1}{2a^2\beta^2}\left[1 - (2a\beta + 1)e^{-2a\beta}\right] \quad (193)$$

If the leaves retain all the particles that strike their surfaces so that the parameter β accurately describes the dilution of the particles from the airstream, $\overline{\Delta m}(eff)/\Delta m$ is exactly equal to η, and all the remaining terms of Equation 189 would be canceled. However, if the particles tend to bounce, agglomerate, and roll off the leaves, η should be smaller than $\overline{\Delta m}(eff)/\Delta m$, since most of these particles would be expected to sift downward through the windward portion of the canopy. An analytical expression of $\overline{\Delta m}(eff)/\Delta m$ for the elliptically and half-elliptically shaped canopies could not be readily found; the latter form for the Pine-2 tree required graphical integration for evaluation.

The estimated values of $\overline{\Delta m}(eff)/\Delta m$ and η, along with other pertinent related parameters used in the calculations, are summarized in Table 26 for the avocado, camphor, grapefruit, laurel, and pine trees. The evaluations for the relatively dense foliage of the avocado tree give η values that are almost exactly equal to $\overline{\Delta m}(eff)/\Delta m$. Similar behavior is exhibited by the camphor tree foliage except that, on the average, η is about 80 percent of $\overline{\Delta m}(eff)/\Delta m$, indicating an additional loss of about 20 percent of the particle weight due to bounce or roll-off from the leaves. The value of η for the small grapefruit tree, 0.221, from a random sample of 121 leaves agrees well with the value, 0.227, calculated from the a_L value of the most exposed group of leaves and the computed value of $\overline{\Delta m}(eff)/\Delta m$. This agreement is probably fortuitous; a more fully branched and developed grapefruit tree probably would exhibit retention behavior more like the avocado and camphor tree canopies. However, if, for the more open foliage form of the canopy, the screening coefficient varies with wind speed as it does for the smaller plants, the value of η for the smaller grapefruit trees (spherical canopies) would be given by

$$\eta = \left[\overline{\Delta m}(eff)/\Delta m\right] e^{-0.332\bar{v}_w} \quad (194)$$

The data for the laurel tree, with η values consistently larger than unity, present a discrepancy. The tree was located on a steep hillside that sloped up toward the north-northwest at an angle of 40 to 45 degrees. The tray and plate collectors were set approximately at

level and gave an internally consistent set of data for φ and Δm for sample Set No. 3. (This is the only set for which measurements of all parameters, φ, $\bar{v}_w$, and Δm, are available.) The estimate of the foliar spatial density could be high but no large space void of leaves in the center of the canopy was noted. No significant dependence of η with wind speed in addition to that included in the parameter β is shown by the data. If the slope correction of 40 to 45 degrees is applied to the a_L values, the value of η for the laurel tree would be approximately equal to the calculated value of $\overline{\Delta m}(eff)/\Delta m$.

The values of η and $\eta/[\overline{\Delta m}(eff)/\Delta m]$ for the Pine-2 tree show some further dependence on wind speed than that included in the parameter β. This dependence of η on $\bar{v}_w$ may be represented by

$$\eta = \left[\overline{\Delta m}(eff)/\Delta m\right] e^{-0.300\bar{v}_w} \tag{195}$$

Approximate values of η for trees such as the pine (open foliage and half-elliptically shaped canopy) with a height of 20 to 30 ft and a width of 8 to 12 ft for wind speeds up to about 6 mi per hr may be estimated directly from

$$\eta = e^{-0.468\bar{v}_w} \tag{196}$$

to avoid the graphical integration of $\overline{\Delta m}(eff)/\Delta m$.

The above summary of the η values for trees, including the data in Table 26, is quantitatively rudimentary because of the limited amount of data and because of the many estimates entailed in the data analysis. For the grapefruit, laurel, and pine trees, all values of α (and sin φ) except one were calculated from $\bar{v}_w/\bar{v}_f(50)$ ratios, where $\bar{v}_f(50)$ was derived from sieve analysis data and could be in error by over a factor of two. In several cases, the $\bar{v}_w$ value was estimated (i.e., guessed) on the basis of sensory observation. At best, the scaling functions indicate the order of magnitude of the foliar retention by single trees and the general variation in the amount of falling particles retained from one side of the tree to another.

Personnel Contamination Functions

The personnel contamination functions are similar to those described for the plants in that approximate geometric configurations

are used to derive the dependence of the contamination factors on the particle trajectory angles and the wind speed. The contamination factor, as presented in Part Two, is defined by

$$a_h = \Delta w_h / \Delta m \qquad (197)$$

where Δw_h is the weight of particles retained by any specific portion of the exposed body surface or apparel and Δm is the weight of the deposit per unit area of horizontal ground surface.

In the simple models for the personnel contamination functions described here, it is assumed that the body is in an upright position (standing or walking) and that the shapes of the various parts of the body (or apparel covering them) may be represented by a combination of cylinders, spheroids, spheres, and plane sections, each with a specific set of dimensions for estimating projected areas. Some of the models are as follows:

1. Body without head (or portion thereof, including clothing such as a blouse, shirt, suit coat, trousers, or dress):

$$a_h = 2\pi a z \alpha \qquad (198)$$

2. Spheroidal head (hair, face, ears, and neck to shoulder height):

$$a_h = \pi a \sqrt{\frac{(1 + \alpha^2)(a^4 + \alpha^2 b^4)}{(a^2 + \alpha^2 b^2)}} \qquad (199)$$

3. Spherical head:

$$a_h = \frac{\pi a^2}{\sin \varphi} \qquad (200)$$

4. Hair (one-half of spherical head):

$$a_h = \frac{\pi a^2}{2} \frac{(1 + \sin \varphi)}{\sin \varphi} \tag{201}$$

5. Vertical appendages and surfaces (forearms, face, ears, spectacles, etc.):

$$a_h = \pi A \alpha \tag{202}$$

in which $\bar{a}$ is the average radius of the represented cylindrical form, z is the length of the form, a is the average radius of the head (computed for the maximum circumference) in the horizontal plane, b is the average radius of the head in the vertical plane, and A is the projected area of the appendage or surface of interest (noting that ears, forearms, etc., usually come in pairs). For the total body without head, $\bar{a}$ would be estimated from a measurement at the waist of the distance around the body, including the arms at each side; $\bar{a}$ is then

$$\bar{a} = C/6.28 \tag{203}$$

where C is the measured circumferential distances. The length z is the distance from the ground to the shoulders. For a blouse or shirt, C would be measured at chest height, again including the arms, and z would be the distance from the waist to the shoulers. The ears and hands may be represented by elliptically shaped plane sections, the forearms by cylinders, the spectacles by rectangles or ellipses, and the face by a half-cylindrically shaped section.

Because of movement of a person exposed to a particle shower and because of local variations in wind speed and direction, continuous exposure of all parts of the body to the impaction of particles during the shower will not occur (on the average). The situations for which the personnel contamination data reported here pertain all entailed movement during exposure (sampling, walking around, etc.); however, some care was taken not to rub particles off arms and face or out of the hair to obtain some information on the particle retention efficiency of the human shape. No special term is included in the scaling functions to account for the frequency or duration of direct impaction on parts of the body such as the face or an ear. The effect is left to be accounted

for in the derived values of η (which also include impaction and retention and wind effects).

The geometric coefficients applicable to the personnel contamination functions listed above and the data available for reduction are given in Table 27 along with special designators of the coefficient η. In the case where η should have the same value after accounting for geometry, the same designation of η is used for different parts of the body or apparel.

The values of η for the personnel decontamination functions, as derived from the data taken in the second phase of the field work, are given in Table 28. The integrated wind speed, τ, for each exposure is also given as is the estimated value of φ. The better-known values of φ are those for samples PC-14 through PC-26; the last two samples (PC-25 and PC-26) coincided exactly with a set of plate collector measurements. The data show that the η values decrease with time of exposure and with the wind speed; this behavior is especially evident for the $\eta(h)$ values which are the most abundant in the table. The decrease in the η values, with both wind speed and time, is probably due to both a decrease in impaction and retention of the particles with wind speed during deposition and subsequent removal of some of the particles that are initially retained. The η values were finally correlated with τ (where τ is equal to the product $\bar{v}_w t$, with $\bar{v}_w$ being the average wind speed over the total exposure time, t) by fitting the data to the wind erosion function defined by

$$\eta = \eta^o e^{-p_w \tau} \tag{204}$$

The computed values of η are plotted as a function of τ in Figures 29 and 30. Except for $\eta(h)$, some assumption about the va[illegible] of η^o for the other body parts was required because of the scatter in the data and the relatively small number of observations. For $\eta^o(e)$ and $\eta^o(b)$, a value of 0.5 was selected on the basis of a random frequency of direct exposure and a relatively higher degree of retention under calm wind conditions than for the observed conditions. On the same basis, $\eta^o(s)$ was taken to be 0.1 and $\eta^o(f)$ to be 0.2. These values lead to average p_w values that are conceptually consistent with the p_w value for hair. The two equation constants for all sets of data are as follows:

$\eta^o(h) = 2.16$; $p_w(h) = 0.0781$ (crew cut)

$\eta^o(h) = 1.27$; $p_w(h) = 0.0781$ (medium cut)

$\eta^o(e) = 0.5$; $p_w(e) = 0.0974$

$\eta^o(f) = 0.2$; $p_w(f) = 0.118$

$\eta^o(fa) = 0.29$; $p_w(fa) = 0.0514$

$\eta^o(b) = 0.5$; $p_w(b) = 0.0945$

$\eta^o(s) = 0.1$; $p_w(s) = 0.120$

In addition, it is apparent that Equation 204 could not prevail indefinitely as τ increased to large values either because of high wind speed during exposure or because of an extended period of weathering. The horizontal portions of the curves in the figures were added to suggest that η probably would not decrease beyond about 0.01 η^o due to entrapment of particles at the base of the hair or in the cloth fibers, folds, or pockets of wearing apparel.

No attempt is made here to correlate the data presented in this report with other available personnel contamination data since this is the only set for which values of both φ and τ are available for correlation purposes.

Table 14

PARTICLE TRAJECTORY ANGLES
USED TO INITIATE THE DATA ANALYSIS

Plate Collector Set Number	φ (degrees)	Sample Numbers for Coincident Deposits
6	39° 34'	14291 to 14307
9	24° 00'	14336
10 and 11	15° 23'	14346 to 14351
13	9° 16'	14444 to 14459
14	9° 45'	14592 to 14603
20	19° 48'	06492 to 06502
21	24° 39'	06506 to 06518

Table 15

SUMMARY OF F(φ) VALUES AND DERIVED PARTICLE TRAJECTORY ANGLES

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	F(φ)	φ	α	Sample Number	w_L (gm/sq ft)	F(φ)	φ	α
1. Young Beans									
14595	0.576	0.0344	-	-	06219	0.405	0.0780	-	-
06501	0.321	0.0472	-	-	06582	0.212	0.0492	-	-
065[illegible]3	0.300	0.0632	-	-	06583	0.288	0.0955	-	-
06513	0.300	0.0994	-	-	06610	0.257	0.0526	-	-
06526	0.264	0.120	-	-					
2. Bush Beans									
14013	1.94	0.0341	$12^\circ 38'$	4.462	14130	7.90	0.0596	$22^\circ 20'$	2.434
14121	4.44	0.0345	$21^\circ 58'$	1.602	14294	0.483	0.0882	$17^\circ 16'$	3.217
14200	12.99	0.0463	$17^\circ 50'$	3.108	14402	3.36	0.1806	$7^\circ 27'$	7.647
14347	0.750	0.0324	$12^\circ 13'$	4.619	06016	0.826	0.0728	$18^\circ 40'$	2.960
14446	3.06	0.0298	$19^\circ 02'$	2.899					
06058	1.73	0.0360	$27^\circ 46'$	1.899					
3. Pole Beans									
14691	4.84	0.1062	$11^\circ 54'$	4.744	14632	0.870	0.0945	$12^\circ 34'$	1.486
06499	1.51	0.0819	$16^\circ 40'$	3.340	14723	11.14	0.0442	$27^\circ 55'$	1.887
06512	1.14	0.0760	$17^\circ 48'$	3.114	14724	3.70	0.0233	$44^\circ 51'$	0.9948
06512	1.14	0.0796	$16^\circ 49'$	3.331	14753	16.66	0.0384	$31^\circ 08'$	1.656
06528	1.74	0.0719	$19^\circ 28'$	2.829	14754	3.13	0.0341	$34^\circ 14'$	1.470

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	F(φ)	φ	α	Sample Number	w_L (gm/sq ft)	F(φ)	φ	α
3. Pole Beans (continued)									
					06334	0.768	0.0633	22° 23'	2.429
					06348	1.09	0.0205	51° 06'	0.8067
					06391	6.00	0.0495	28° 07'	1.872
					06392	0.516	0.0443	30° 49'	1.676
					06425	0.648	0.1156	12° 24'	4.549
					06426	4.42	0.0474	28° 12'	1.865
					06443	0.663	0.0434	31° 14'	1.649
					06444	2.50	0.0401	33° 17'	1.523
					06584	1.26	0.0370	35° 51'	1.384
					06585	1.88	0.0745	19° 45'	2.786
4. Beets									
14450	0.969	0.0490	12° 05'	4.671	14405	2.67	0.1790	7° 55'	7.191
14596	4.04	0.1514	2° 09'	26.64	14515	2.04	0.0880	13° 31'	4.160
14696	3.55	0.0880	7° 16'	7.842	14539	1.90	0.0591	24° 31'	2.193
06111	0.228	0.0471	15° 50'	3.526	14563	8.02	0.0375	53° 11'	0.7486
					14636	4.97	0.0415	12° 59'	4.337
					14758	6.53	0.0507	17° 03'	3.261
					06117	0.183	0.0435	-	-
					06136	0.310	0.0738	29° 08'	1.794
					06174	0.180	0.0521	-	-
					06215	0.947	0.0966	25° 06'	2.135
					06270	1.82	0.1026	24° 52'	2.158

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α	Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α
				5. Young Cabbage					
14015	0.0482	0.0617	12° 08'	4.649	14088	0.0456	0.218	8° 45'	6.492
14043	0.0236	0.0690	16° 56'	3.285	14129	0.369	0.0993	38° 34'	1.254
14075	0.0407	0.0277	18° 31'	2.386	14726	1.05	0.0754	33° 02'	1.537
14123	0.460	0.0300	55° 40'	0.6829	06015	0.0183	0.128	33° 17'	1.524
06500	0.0315	0.0700	23° 15'	2.328	06064	0.217	0.122	32° 59'	1.541
06514	0.0195	0.0686	23° 15'	2.328	06580	0.0179	0.170	25° 51'	2.064
06514	0.0195	0.0652	22° 40'	2.394					
06527	0.0230	0.132	14° 41'	3.816					
				6. Headed Cabbage					
14202	6.44	0.0809	11° 19'	4.997	14295	25.3	0.1046	52° 22'	0.7710
14233	3.32	0.0235	-	-	14406	46.5	0.1028	54° 48'	0.7054
14240	6.15	0.0563	18° 01'	3.075	06118	6.70	0.1126	44° 09'	1.030
14268	6.61	0.0834	10° 55'	5.185	06139	2.31	0.1220	37° 36'	1.295
14348	44.1	0.0628	15° 37'	3.578	06165	2.51	0.1410	29° 11'	1.790
14349	23.7	0.0514	20° 26'	2.684	06176	1.71	0.1642	23° 04'	2.348
14453	32.4	0.0418	27° 56'	1.886	06217	13.2	0.0666	-	-
14707	0.931	0.0280	-	-					
14755	2.18	0.0413	28° 21'	1.853					
06109	3.75	0.0924	9° 40'	5.871					

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α	Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α
				7. Carrot					
14602	1.84	0.00598	$9^{\circ}57'$	5.700	14516	1.06	0.0452	$34^{\circ}36'$	1.450
06112	0.226	0.0133	$13^{\circ}09'$	4.280	14564	1.76	0.0633	$20^{\circ}16'$	2.708
06167	0.530	0.0491	$16^{\circ}25'$	3.394	14637	1.94	0.0273	$15^{\circ}00'$	3.732
06496	1.53	0.0171	$21^{\circ}17'$	2.502	14695	5.59	0.0456	$12^{\circ}17'$	4.593
06510	1.40	0.0158	$23^{\circ}07'$	2.343	14759	3.37	0.0322	$26^{\circ}08'$	2.038
06510	1.40	0.0141	$21^{\circ}56'$	2.483	06115	0.314	0.0631	$43^{\circ}15'$	1.063
					06138	0.173	0.0610	$53^{\circ}19'$	0.7449
					06173	0.274	0.0861	$33^{\circ}32'$	1.509
					06214	1.20	0.0753	-	-
					06269	1.75	0.1033	$28^{\circ}42'$	1.826
					06442	0.736	0.1039	$14^{\circ}26'$	3.885
					06530	1.02	0.0863	$14^{\circ}04'$	3.991
					06578	0.624	0.0747	$25^{\circ}58'$	2.053
					06579	0.942	0.1089	$15^{\circ}17'$	3.660
					06608	1.84	0.0543	$32^{\circ}24'$	1.576
				8. Young Corn					
14014	0.156	0.0715	$12^{\circ}43'$	4.431	14087	0.215	0.1042	$13^{\circ}52'$	4.051
14041	0.208	0.0250	$21^{\circ}28'$	2.543	14102	0.123	0.0497	$21^{\circ}38'$	2.521
14076	0.0820	0.0354	$14^{\circ}59'$	3.736	14128	0.232	0.1653	$17^{\circ}48'$	3.115
14101	0.179	0.0832	$14^{\circ}58'$	3.741	14518	0.0840	0.1524	$16^{\circ}49'$	3.309
14122	0.330	0.1553	$50^{\circ}36'$	0.8214	14542	0.0655	0.1006	$34^{\circ}45'$	1.442
14600	0.523	0.0998	$10^{\circ}00'$	5.671	14566	0.132	0.0853	$25^{\circ}38'$	2.084

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α	Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α
					8. Young Corn (continued)				
					06014	0.109	0.1034	23° 15'	2.328
					06059	0.894	0.1104	30° 16'	1.714
					06332	0.413	0.1663	17° 09'	3.240
					06349	0.329	0.0471	27° 47'	1.898
					06439	0.793	0.2267	14° 33'	3.853
					9. Corn, without tassel				
14203	14.7	0.0614	11° 19'	4.997	14762	9.03	0.0799	25° 44'	2.075
14234	1.93	0.0649	11° 07'	5.089	06121	10.2	0.0612	40° 55'	1.154
14241	2.89	0.0119	2[illegible]° 12'	2.450	06145	8.56	0.1124	52° 04'	0.7794
14699	5.41	0.0458	17° 17'	3.214	06168	6.23	0.1594	22° 36'	2.402
06493	15.5	0.0342	22° 28'	2.418	06181	1.53	0.0959	27° 56'	1.886
06506	9.64	0.0344	22° 34'	2.406	06387	19.6	0.0624	23° 29'	2.302
06506	9.64	0.0458	24° 19'	2.213	06388	1.24	0.1403	29° 56'	1.737
06524	17.2	0.0775	17° 41'	3.137	06420	2.07	0.2509	16° 54'	3.291
					06575	4.97	0.1294	26° 02'	2.047
					06576	3.46	0.1124	24° 49'	2.162
					10. Corn, with tassel				
14456	11.0	0.0902	12° 06'	4.665	14300	16.5	0.0633	40° 06'	1.188
06492	93.3	0.0512	22° 21'	2.432	06267	26.8	0.0696	36° 27'	1.354
06525	47.8	0.0786	14° 02'	4.001	06605	49.1	0.0771	32° 46'	1.[illegible]4

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α	Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α
					11. Grass (Barley)				
14071	7.25	0.0564	9° 07'	6.232	14136	26.0	0.0353	48° 23'	0.8882
14093	7.42	0.113	7° 17'	7.823	14194	27.1	0.0345	46° 14'	0.9581
14127	32.1	0.0261	71° 37'	0.3324	06021	7.88	0.0466	35° 24'	1.407
14705	6.98	0.0419	23° 25'	2.309	06066	24.6	0.0405	40° 37'	1.166
06536	-	0.0315	49° 32'	0.8529	06427	2.72	0.185	5° 47'	9.882
06537	4.72	0.0348	43° 41'	1.047	06446	3.28	0.132	9° 13'	6.145
					06590	4.28	0.0483	33° 16'	1.524
					06613	6.04	0.0577	24° 05'	2.238
					12. Grass (Oats)				
14070	13.7	0.0276	13° 02'	4.327	14137	37.6	0.0205	56° 58'	0.6504
14092	13.0	0.0512	11° 16'	5.017	14195	45.9	0.0180	61° 41'	0.5376
14126	23.2	0.0270	42° 57'	1.074	14638	2.26	0.0450	10° 57'	5.169
14603	1.97	0.0260	17° 05'	3.254	14764	19.2	0.0519	12° 03'	4.683
14703	18.9	0.0190	38° 27'	1.259	06020	6.61	0.0351	30° 03'	1.729
06503	11.8	0.0535	13° 35'	4.141	06065	31.0	0.0272	40° 02'	1.190
06516	14.8	0.0444	16° 39'	3.345	06589	11.1	0.0635	14° 03'	3.994
06516	14.8	0.0236	35° 24'	1.407	06612	18.0	0.0141	79° 08'	0.1909
06535	13.8	0.0429	19° 40'	2.798					

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α	Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α
				13. Grass (Rye)					
14019	6.61	0.0998	10° 18'	5.238	[illegible]82	6.40	0.0563	21° 39'	2.519
14069	7.07	[illegible]	16° 23'	3.400	14196	16.4	0.0571	21° 16'	2.569
14094	5.80	[illegible]	[illegible]	6.00[illegible]	06022	3.52	0.0472	27° 09'	1.950
14125	18.2	0.0[illegible]39	[illegible]	[illegible]4938	06063	28.5	0.0351	39° 57'	1.194
				14. [illegible] (Wheat)					
14017	5.67	0.0779	7° 47'	7.311	14083	6.91	0.0837	8° 33'	6.656
14018	3.55	0.112	5° 13'	10.9[illegible]	14135	17.4	0.0574	24° 51'	2.159
14067	9.17	0.0229	26° 19'	2.021	14197	33.5	0.0298	53° 29'	0.7403
14068	6.96	0.0456	11° 16'	5.016	06019	5.05	0.0517	29° 46'	1.748
14091	4.04	0.0721	11° 47'	4.792	06062	32.3	0.0263	65° 53'	0.4476
14124	22.4	0.0502	31° 25'	1.637	06588	9.25	0.0289	61° 01'	0.5538
14704	7.50	0.0550	16° 05'	3.470					
06502	7.10	0.0238	60° 35'	0.5637					
06515	7.47	0.0270	51° 07'	0.8062					
06515	7.47	0.0343	35° 43'	1.391					
06534	9.71	0.0481	27° 37'	1.911					
				15. Lettuce					
14452	0.592	0.0680	31° 17'	1.646	14404	0.392	0.2455	11° 16'	5.020
14597	4.38	0.1571	10° 51'	5.217	14517	1.60	0.1532	20° 50'	2.628
14631	5.31	0.1290	12° 42'	4.437	14540	3.42	0.1172	31° 28'	1.634

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α	Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α
15. Lettuce (continued)									
14697	9.43	0.1063	16° 15'	3.431	14565	4.98	0.1326	25° 43'	2.076
06113	0.318	0.1318	12° 21'	4.567	14760	13.8	0.1278	27° 17'	1.939
06166	0.316	0.0858	21° 49'	2.498	06114	0.304	0.1009	41° 23'	1.135
					06134	0.400	0.0982	43° 46'	1.044
					06172	0.316	0.1516	21° 08'	2.587
					06213	0.594	0.1232	28° 56'	1.809
					06268	0.690	0.1548	20° 37'	2.658
16. Onion									
14449	2.75	0.00777	14° 14'	3.944	14296	0.864	0.00922	49° 58'	0.8402
14595	3.82	0.00976	6° 02'	9.478	14403	2.89	0.01513	27° 43'	1.904
14694	9.68	0.00322	37° 30'	1.303	14514	1.36	0.01528	19° 24'	2.839
06110	0.335	0.02748	5° 19'	10.76	14538	3.92	0.01316	23° 34'	2.292
					14562	3.50	0.00987	28° 36'	1.834
					14634	3.04	0.00758	12° 44'	4.528
					14757	12.7	0.00404	37° 30'	1.303
					06061	0.190	0.00938	37° 30'	1.303
					06116	0.582	0.00595	55° 47'	0.6800
					06137	0.379	0.00348	70° 49'	0.3480
					06175	1.01	0.00234	77° 35'	0.2202
					06216	1.08	0.02875	22° 49'	2.377
					06271	1.30	0.02873	22° 12'	2.451

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α	Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α
				17. Pea					
14599	1.23	0.0378	9° 34'	5.935	14519	0.296	0.0370	19° 35'	2.812
14700	6.56	0.0420	16° 36'	3.356	14541	0.288	0.0339	22° 42'	2.391
14702	15.8	0.0533	12° 41'	4.415	14567	0.438	0.0235	32° 26'	1.574
06494	6.52	0.0258	44° 06'	1.032	14630	1.58	0.0242	12° 45'	4.422
06507	9.22	0.0434	24° 31'	2.192	14763	11.3	0.0194	26° 14'	2.030
06507	9.22	0.0762	11° 54'	4.746	06333	0.213	0.0595	13° 27'	4.183
06523	5.98	0.0390	33° 42'	1.199	06350	0.312	0.0155	51° 02'	0.8086
					06384	0.356	0.0435	20° 30'	2.674
					06386	2.74	0.0428	20° 53'	2.621
					06419	2.79	0.0621	11° 21'	4.983
					06421	0.406	0.0631	11° 09'	5.073
					06433	2.19	0.0254	36° 16'	1.363
					06440	0.[illegible]4	0.0342	26° 09'	2.037
					06574	8.88	0.0262	37° 43'	1.293
					06606	7.17	0.0911	8° 16'	6.878
				18. Pepper					
14448	0.0772	0.0133	-	-	14513	0.204	0.169	-	-
14693	0.986	0.0110	15° 51'	3.522	14537	0.210	0.159	-	-
06497	0.657	0.0316	-	-	14594	0.412	0.0837	-	-
					14635	0.318	0.121	-	-
					14725	1.89	0.0328	30° 52'	1.673
					14756	1.34	0.0208	52° 40'	0.7627
					06389	2.03	0.0430	28° 40'	1.829
					06423	0.522	0.118	-	-

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	F(φ)	φ	α	Sample Number	w_L (gm/sq ft)	F(φ)	φ	α
				19. Potato					
14598	0.438	0.1559	2° 24'	23.86	14761	1.13	0.0878	25° 39'	2.082
14698	1.16	0.0723	15° 40'	3.566	06385	2.08	0.0716	-	-
06495	2.60	0.1223	17° 12'	3.230	06422	0.664	0.2510	12° 08'	4.651
06508	1.67	0.0699	38° 59'	1.236	06441	0.728	0.1894	22° 44'	2.387
06509	2.22	0.0812	29° 52'	1.741	06577	3.83	0.1733	29° 37'	1.759
06531	1.31	0.2399	9° 54'	5.730	06607	1.77	0.1393	32° 23'	1.577
06532	2.49	0.1686	15° 17'	3.660					
				20. Radish					
14593	1.14	0.0226	11° 53'	4.752	14633	1.45	0.0270	19° 51'	2.770
14692	4.20	0.0380	23° 22'	2.315	06390	1.81	0.0609	-	-
06498	6.04	0.0411	-	-	06424	1.40	0.2397	7° 35'	7.511
06511	6.36	0.0581	33° 22'	1.518	06445	0.969	0.0723	-	-
06511	6.36	0.0950	13° 15'	4.267	06581	2.40	0.1147	33° 42'	1.499
06529	5.60	0.1477	13° 30'	4.165	06609	6.00	0.1671	13° 37'	4.128
				21. Squash					
14012	0.948	0.0220	-	-	14134	0.574	0.0884	26° 18'	2.023
14072	0.795	0.0275	28° 42'	1.826	06017	0.146	0.1275	16° 39'	3.344
14120	1.15	0.0664	50° 02'	0.3381	06057	3.10	0.2792	11° 08'	5.081
14231	0.416	0.0958	14° 14'	3.942					
14266	2.31	0.1966	9° 22'	6.062					
14336	10.1	0.1730	21° 37'	2.524					
14316	5.12	0.0807	16° 06'	3.465					

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	F(φ)	φ	α	Sample Number	w_L (gm/sq ft)	F(φ)	φ	α
				22. Tomato					
14016	0.194	0.0182	18° 41'	2.95	14086	0.152	0.0601	14° 02'	4.001
14042	0.160	0.0106	-	-	14100	0.178	0.0288	48° 28'	0.8858
14074	0.151	0.0407	5° 04'	11.28	14132	0.282	0.0594	40° 42'	1.163
14099	0.163	0.0376	12° 04'	4.678	14297	1.07	0.1173	47° 01'	0.9320
14447	1.14	0.1213	12° 10'	4.633	14401	1.15	0.1610	20° 48'	2.632
					06018	0.0306	0.0316	-	-
					06060	0.279	0.0361	-	-
				23. Barley (stalks)					
					14306	50.3	0.00828	38° 11'	1.272
					14396	55.3	0.01145	24° 22'	2.208
					06126	43.4	0.00922	42° 21'	1.097
					06143	32.4	0.01679	51° 15'	0.8024
					06225	45.8	0.01206	23° 16'	2.326
					06277	55.6	0.00788	37° 42'	1.294
				24. Barley (heads)					
14236-2	14.3	0.00410	17° 12'	3.230	14305-2	32.3	0.00738	33° 44'	1.497
14243-2	22.0	0.00526	13° 49'	4.068	14395-2	35.7	0.01102	20° 17'	2.705
					06124-2	19.6	0.00582	36° 31'	1.350
					06132-2	17.2	0.00499	41° 57'	1.113
					06180-2	19.3	0.00249	62° 48'	0.5139
					06222-2	26.8	0.01013	27° 16'	1.940
					06277-2	26.7	0.00449	48° 46'	0.8767

Table 15 (continued)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α	Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α
				25. Oats (stalks)					
					14304	40.8	0.01282	39° 30'	1.213
					14394	58.8	0.01035	25° 55'	2.058
					06125	77.7	0.01358	40° 41'	1.163
					06142	61.0	0.01952	52° 16'	0.7737
					06227	41.6	0.01244	22° 00'	2.474
					06273	38.9	0.01106	36° 58'	1.328
				26. Oats (heads)					
14237-2	7.28	0.00412	11° 28'	4.928	14303-2	16.2	0.00308	50° 22'	0.8283
14244-2	11.3	0.00225	20° 43'	2.644	14393-2	22.7	0.00885	18° 47'	2.940
					14521-2	40.7	0.00464	26° 46'	1.982
					14544-2	31.7	0.00440	28° 58'	1.806
					06123-2	20.7	0.00310	46° 01'	0.9648
					06131-2	19.0	0.00355	43° 18'	1.061
					06179-2	14.0	0.00265	53° 55'	0.7286
					06221-2	13.3	0.01163	18° 47'	2.940
					06273-2	11.3	0.00511	32° 25'	1.575
					06337-2	24.8	0.00770	19° 00'	2.904
				27. Wheat (stalks)					
					14302	20.3	0.00874	39° 44'	1.203
					14392	25.6	0.01003	25° 11'	2.127
					14765	20.0	0.00970	25° 56'	2.057

Table 15 (concluded)

Dry Conditions					Damp Conditions				
Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α	Sample Number	w_L (gm/sq ft)	$F(\varphi)$	φ	α
					27. Wheat (stalks) (continued)				
					06127	25.4	0.01279	45° 22'	0.9873
					06141	24.0	0.01401	47° 19'	0.9223
					06226	29.6	0.01154	22° 13'	2.448
					06275	34.4	0.00714	37° 49'	1.288
					06611	11.9	0.00725	33° 01'	1.538
14235-2	3.60	0.00313	13° 14'	4.250	14301-2	6.96	0.00534	35° 51'	1.384
14242-2	5.34	0.00210	19° 48'	2.777	14338-2	9.88	0.00882	24° 37'	2.182
					14391-2	12.6	0.00622	26° 10'	2.036
					14520-2	23.9	0.00581	21° 41'	2.515
					14543-2	27.8	0.00408	30° 40'	1.687
					14766-2	5.64	0.00377	22° 23'	2.427
					06122-2	5.68	0.00317	45° 57'	0.9673
					06130-2	5.36	0.00367	43° 07'	1.068
					06178-2	4.87	0.00473	38° 34'	1.254
					06220-2	11.8	0.00809	27° 05'	1.955
					06275-2	10.0	0.00534	37° 09'	1.320
					06338-2	23.2	0.01182	12° 41'	4.444

Table 16

SUMMARY OF DERIVED PARTICLE TRAJECTORY ANGLES FOR ALL SETS OF PRIMARY FOLIAR SAMPLES
(Value of Cot φ or α)

Plant	14012-14019	14038-14043	14067-14076	14081-14088	14091-14103	14098-14104	14120-14127	14128-14137	14194-14197	14198-14203	14231-14237	14239-14241	14242-14244	14266-14268	14291-14307	14336	14338	14346-14351	14391-14409	14444-14459	14512-14524	14536-14546	14561-14570	14592-14603	14630-14641
Bean	4.462*						1.602*	2.434*		3.108*					3.217			4.619*	7.647	2.899					4.486*
Beet																			7.191	4.671*	4.160	2.193*	0.7486	26.64	4.337*
Cabbage	4.640*	3.280*	2.980*	6.492*			0.6829*	1.254*		4.997*	-	3.075*		5.185*	0.7710*			3.578*	0.7054	1.886					
																		2.684*							
Carrot																					1.450		2.708*	5.700*	3.732*
Corn	4.431*	2.343*	3.736*	4.061*	3.741	2.521*	0.8214*	3.115		4.997*	5.089*	2.450*			1.188*					4.665*	3.309*	1.442*	2.084*	5.671*	
Lettuce																			5.020	1.646	2.628*	1.634*	2.076*	5.217*	4.437*
Onion															0.8402*				1.904*	3.944*	2.839*	2.292*	1.834*	9.478	4.528*
Pea																					2.612*	2.391*	1.574*	5.935*	4.422*
Potato																								23.36	
Radish																								4.752*	2.770
Squash	-		1.836				0.8381*	2.023*			3.942*			6.062*		2.524*		3.465*							
Tomato	2.987	-	11.28	4.001*	4.678*	0.8858		1.163*							0.9320*				2.632*	4.638*					
Barley (grass)			6.232		7.823		0.3324	0.8882*	0.9581*																
Barley (stalks)															1.272*				2.208*						
Barley (heads)											3.230*		4.068		1.497				2.705*						
Oats (grass)			4.327*		5.017*		1.074*	0.6504	0.5376*															3.254	5.169
Oats (stalks)															1.213*				2.058*						
Oats (heads)											4.928*		2.644*		0.8283*				2.940*		1.982*	1.806*			
Rye (grass)	5.236		3.400*	2.519	6.000		0.4938*		2.569																
Wheat (grass)	7.311		2.021	6.656*	4.792*		1.637*	2.159*	0.7403*																
	10.96		5.016																						
Wheat (stalks)															1.203*				2.127*						
Wheat (heads)											4.250*		2.777*		1.384		2.182*		2.036*		2.515*	1.687*			
Average	4.514	2.914	3.612	5.300	4.829	2.521	1.021	1.654	0.7453	4.367	4.288	2.762	2.710	5.624	1.031	2.524	2.182	3.566	2.326	4.480	2.681	1.921	2.055	5.455	4.324
Average fall angle (φ)	12°30'	18°56'	15°28'	10°41'	11°42'	21°42'	44°24'	31°10'	53°18'	12°54'	13°08'	19°54'	20°15'	10°05'	44°08'	21°37'	24°37'	15°35'	23°16'	12°35'	20°27'	27°30'	25°57'	10°23'	13°01'

Plant	14701-14707	14723-14727	14753-14766	06014-06022	06057-06066	06108-06113	06114-06128	06130-06134	06136-06145	06164-06168	06172-06181	06178-06182	06213-06227	06265-06279	06332-06339	06348-06353	06384-06397	06419-06430	06438-06450	06492-06503	06506-06516(2P)	06506-06516	06533-06549	06574-06593	06605-06614
Bean	4.744	1.087*	1.656	2.960*	1.089*										2.429*	0.8067*	1.872*	4.549*	1.649*	3.340	3.114	3.331	2.829*	1.384*	
		0.9048	1.470														1.676*	1.865	1.523*					2.786*	
Beet	7.842		3.281			3.526*	-		1.7[illegible]		-		2.135*	2.158*											
Cabbage	-	1.537*	1.883*	1.524	1.541*	5.871*	1.030*		1.295	1.790	2.348*		-							2.328*	2.328*	2.394*	3.816*	2.084*	
Carrot	4.383		2.830*			4.280*	1.063*		0.7449*	3.394	1.509*		-	1.826*					3.885*	2.502*	2.343*	2.483*	3.991*	2.053*	1.576*
																								3.660*	
Corn	3.214*		2.875*	2.320*	1.714*		1.154*		0.7794*	2.402*	1.886*			1.354*	3.240*	1.898	2.302	3.291*	3.853*	2.418*	2.406*	2.213*	3.137*	2.047*	1.554*
																	1.737*			2.432*			4.001*	2.162*	
Lettuce	3.431*		1.930*			4.367*	1.135*	1.044*		2.498*	2.587*		1.809*	2.658*											
Onion	1.303		1.388		1.303*	10.76	0.6800		0.3489		0.2202		2.377*	2.451*											
Pea	3.386*		2.830*												4.183*	0.8086*	2.674	4.983*	1.363*	1.032	2.192*	4.746	1.499	1.293*	6.878
	4.419																2.621	5.073*	2.037*						
Pepper	3.882*	1.873*	0.7627														1.829*								
Potato	3.380*		2.882*														-	4.651*	2.387*	3.230	1.236		5.730	1.759*	1.577*
																					1.741		3.660*		
Radish	2.315																-	7.511	-	-	1.518	4.267	4.165*	1.499*	4.128
Squash				3.344	5.081																				
Tomato				-	-																				
Barley (grass)	2.380			1.407	1.166*													9.882	5.145				0.8529	1.524*	2.238
																							1.047		
Barley (stalks)							1.087*		0.8027*				2.326*	1.294*											
Barley (heads)							1.350	1.113*				0.5139*	1.940*	0.8767											
Oats (grass)	1.289		4.683	1.729*	1.190*															4.141	3.345	1.407	2.798	3.994	0.1906
Oats (stalks)							1.163*		0.7737*				2.474*	1.328*											
Oats (heads)							0.9648*	1.061*				0.7286*	2.940*	1.575*	2.904*										
Rye (grass)				1.950*	1.194*																				
Wheat (grass)	3.470*			1.740*	0.4476															0.5637	0.8062	1.391	1.911	0.5538	
Wheat (stalks)			2.087*				0.9873*		0.9223*				2.448*	1.288*											1.538*
Wheat (heads)			2.427*				0.9673*	1.088*				1.254*	1.955*	1.320*	4.444*										
Average	3.428	1.709	2.062	2.143	1.430	4.561	1.062	1.072	0.8046	2.450	2.082	0.8323	2.267	1.725	3.440	0.8076	1.778	4.509	2.385	2.420	2.317	2.363	3.657	2.021	1.561
Average fall angle (φ)	16°16'	30°20'	25°52'	25°01'	34°58'	12°22'	43°16'	43°01'	51°11'	22°12'	25°39'	50°14'	23°48'	30°08'	16°13'	51°04'	29°21'	12°30'	22°45'	22°27'	23°20'	22°56'	15°17'	26°20'	32°38'

* Values used for calculating averages.

Figure 6

COMPARISON OF PARTICLE TRAJECTORIES COMPUTED FROM WIND SPEED, SIEVE ANALYSIS, AND PLATE COLLECTOR DATA WITH THOSE DERIVED FROM THE FOLIAR CONTAMINATION DATA

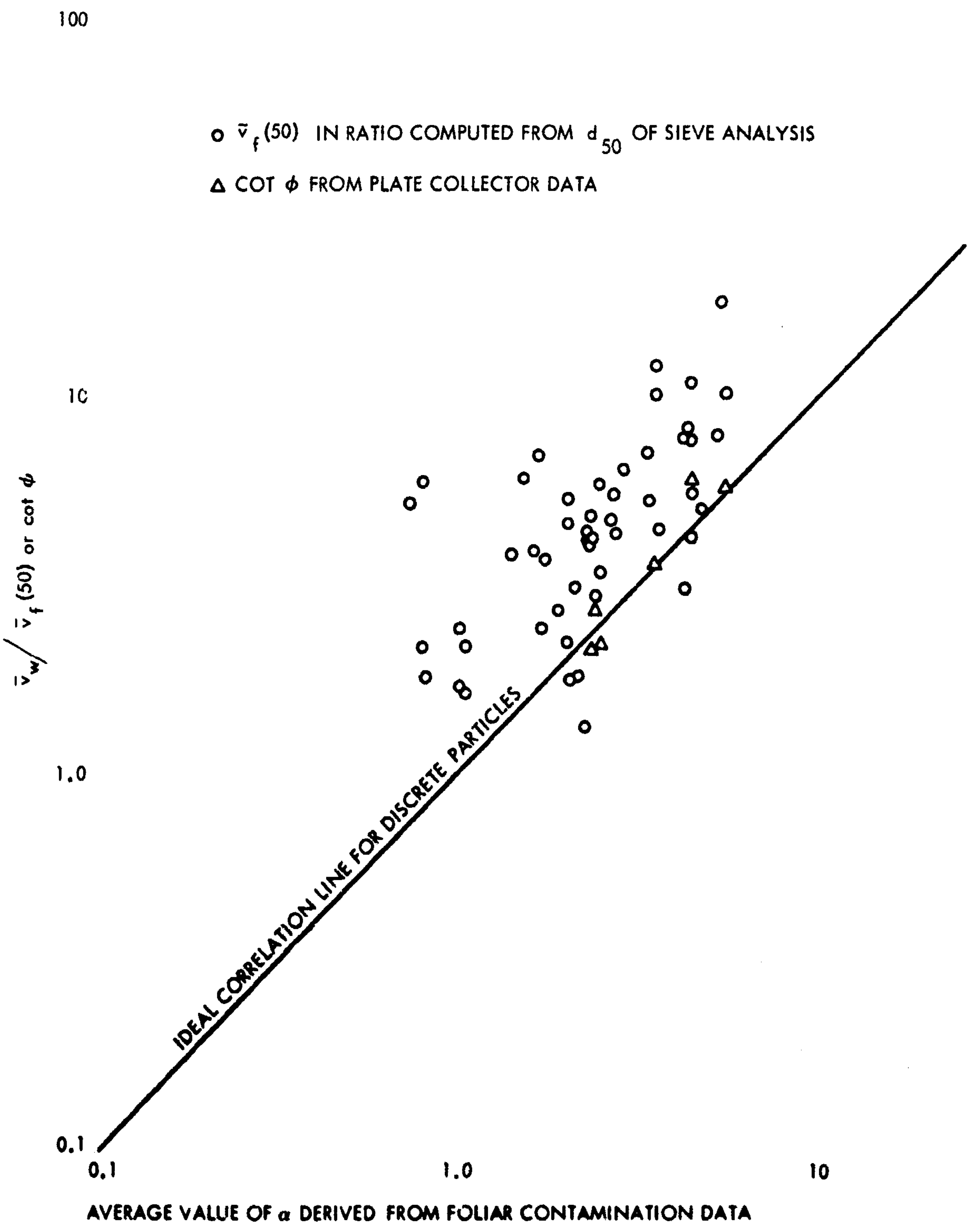


Table 17

COMPUTED VALUES OF θ FOR TOP EXPOSED SQUASH LEAVES

Dry Conditions			Damp Conditions		
Sample Number	$\bar{v}_w$ (mi/hr)	θ (degrees)	Sample Number	$\bar{v}_w$ (mi/hr)	θ (degrees)
14039-1	6.3	153° 50'	14083-1	7.3	175° 16'
14095-1	6.2	155° 14'	14084-1	7.3	152° 35'
14198-1	8.9	172° 01'	14096-1	7.0	111° 42'
14239-1	8.6	183° 25'	14291-1	1.7	176° 29'
14266-1(1)[a]	6.3	169° 55'	14343-1	1.5	180° 56'
14266-1(2)	6.3	171° 47'	14399-1	2.[illegible]	173° 05'
14266-1(3)	6.3	156° 03'	14400-1	2.7	184° 17'
14266-1(4)	6.3	181° 46'	14512-1	3.9	187° 42'
14266-1(5)	6.3	169° 20'	14536-1	3.7	177° 09'
14266-1(6)	6.3	189° 00'	14561-1	3.9	187° 32'
14266-1(7)	6.3	177° 01'	06119-1	2.4	133° 16'
14266-1(8)	6.3	182° 41'	06140-1	2.2	174° 44'
14350-1	9.3	180° 00'	06164-1	2.7	145° 47'
14351-1	9.3	173° 58'	06177-1	1.8	170° 44'
14445-1	7.0	178° 42'	06218-1	1.4	181° 40'
06108-1	6.2	174° 30'			

a Parentheses indicate leaf numbers for one plant; azimuths of line to leaf tip from the center of the plant were: (1) 30°; (2) 320°; (3) 230°; (4) 200°; (5) 140°; (6) 120°; (7) 90°; and (8) 50°. The deposit was on the top side of all leaves; assumed that θ > φ for all leaves. Leaf (3) at an azimuth of 320° received the largest deposit; this leaf also has the lowest value of θ. Leaves (1) and (3) were new smaller leaves. Fallout direction probably was about 300°, opposite from leaf (6) with the largest value of θ.

Figure 7

VARIATION OF $\dfrac{F(\phi)\sin\phi}{(1+\sin\phi)}$ WITH WIND SPEED FOR BEET AND CARROT

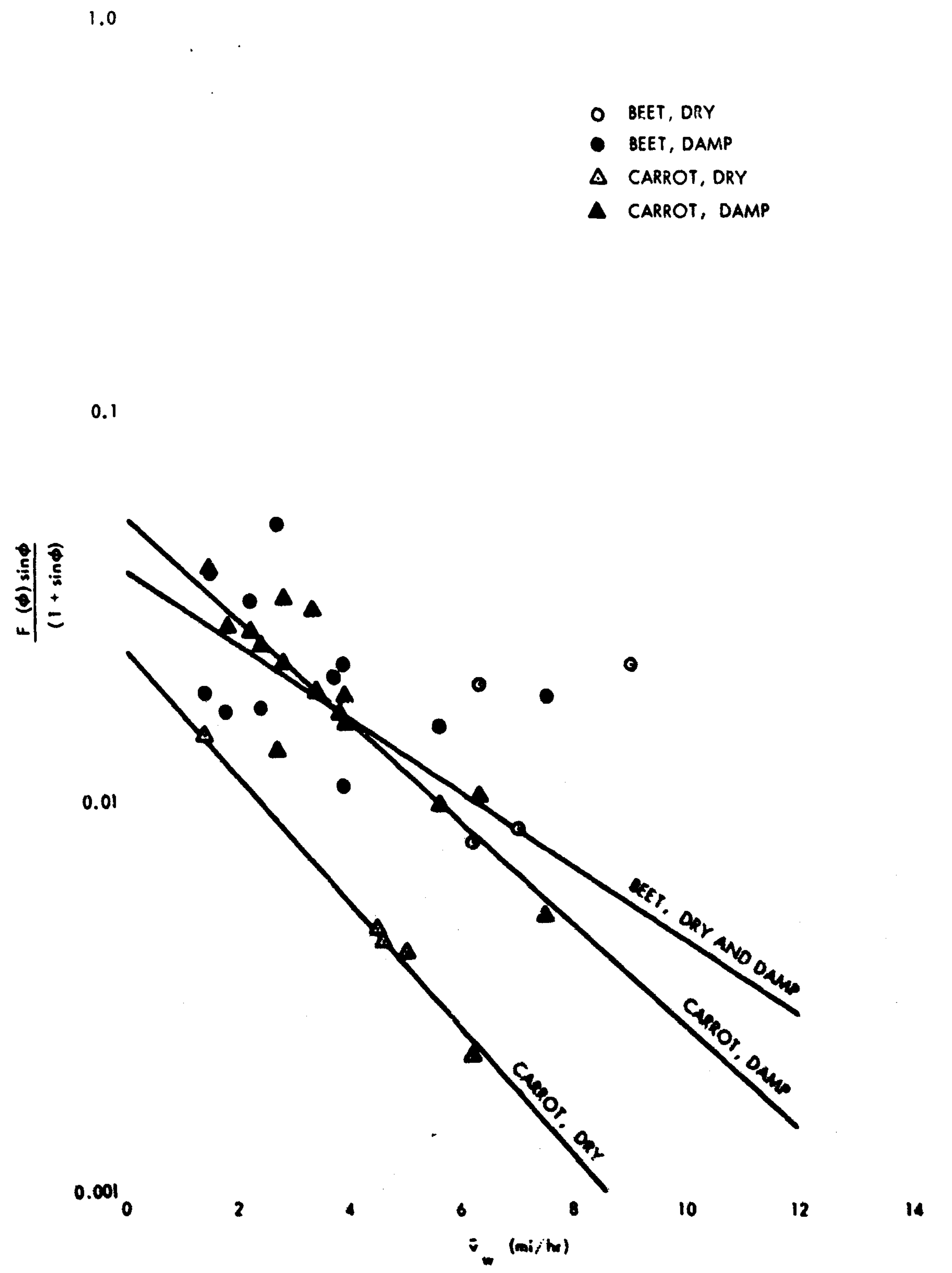


Figure 8

VARIATION OF $F(\phi)e^{k_n\bar{v}w}$ WITH α FOR SMALL CORN PLANTS

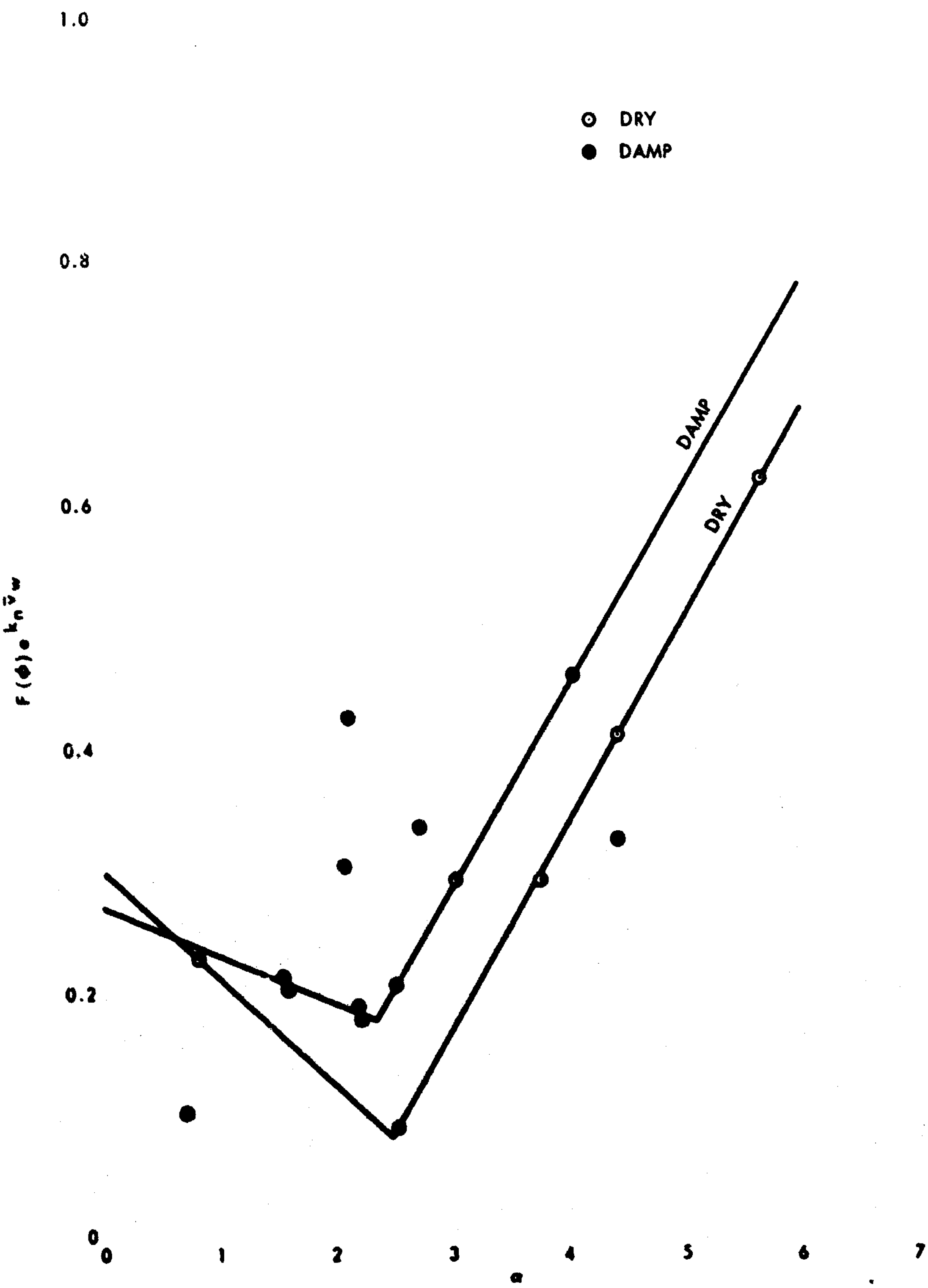


Figure 9

VARIATION OF $F(\phi)e^{k_n \bar{v}_w}$ WITH α FOR LARGE CORN PLANTS

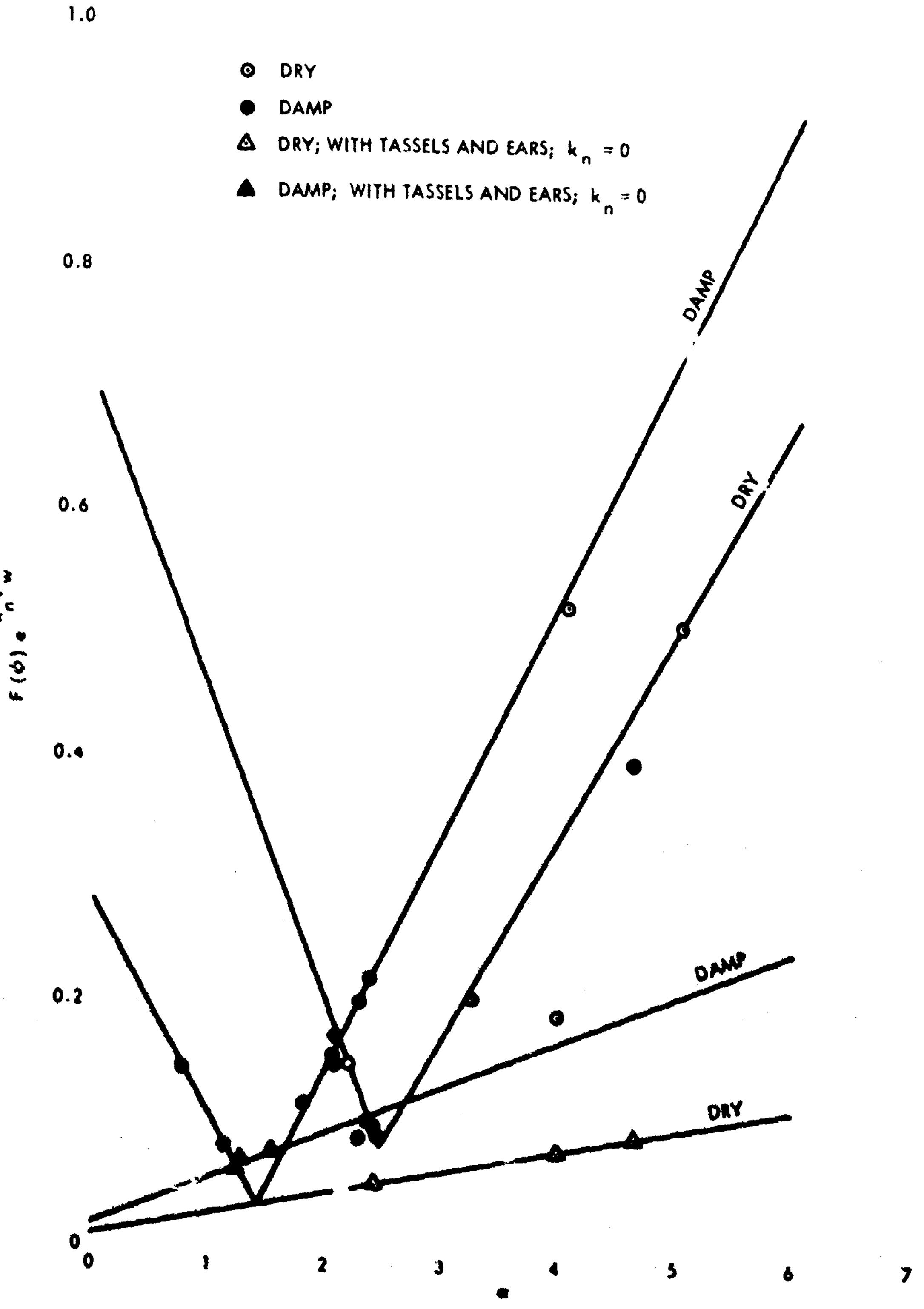


Figure 10

VARIATION OF $\frac{a_L}{(\alpha + 1)}$ WITH WIND SPEED FOR GRASS FORMS OF BARLEY, OATS, AND WHEAT

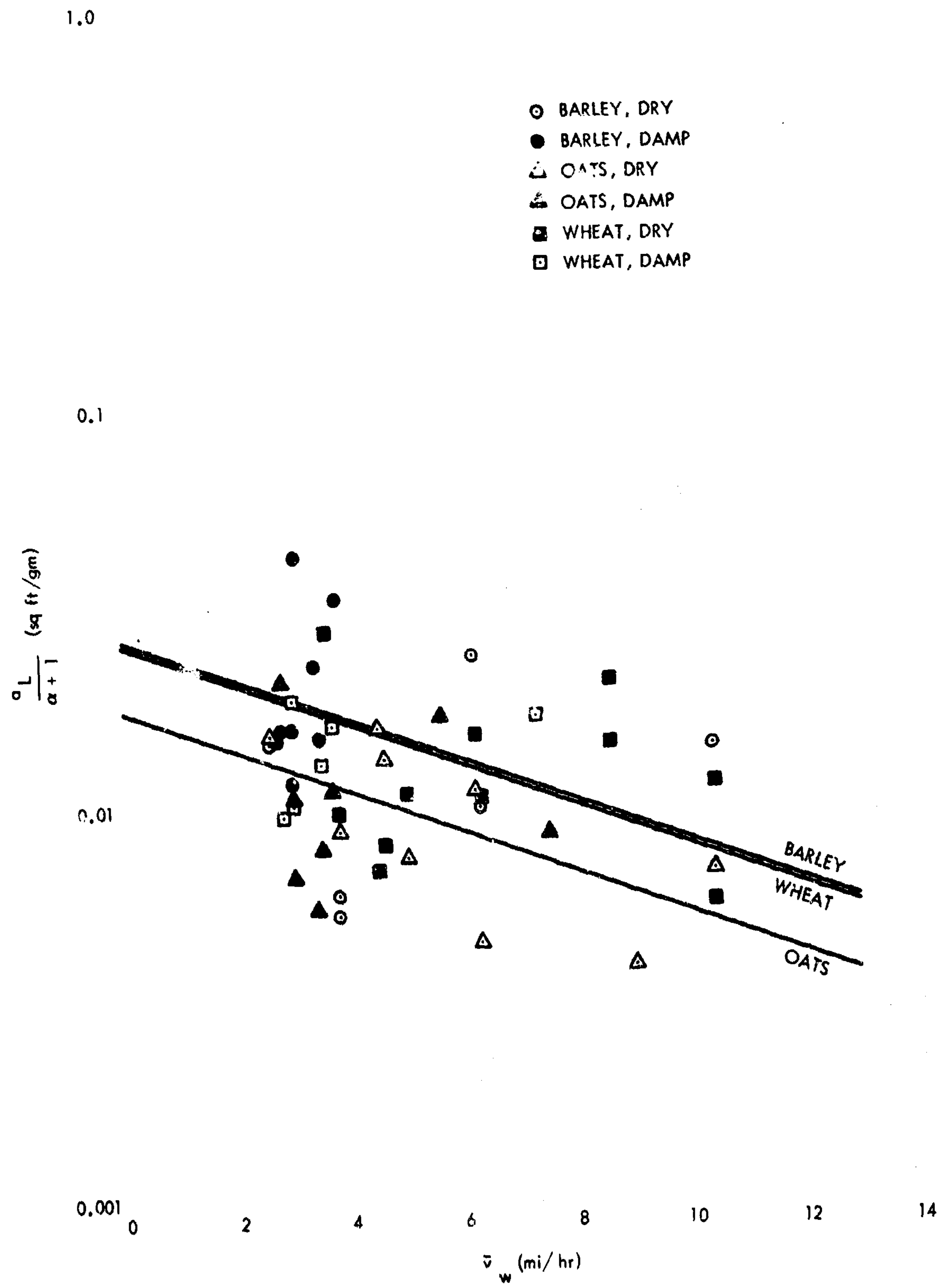


Figure 11

VARIATION OF $\dfrac{F(\phi)\sin\phi}{(1+\sin\phi)}$ WITH WIND SPEED FOR SQUASH AND RADISH

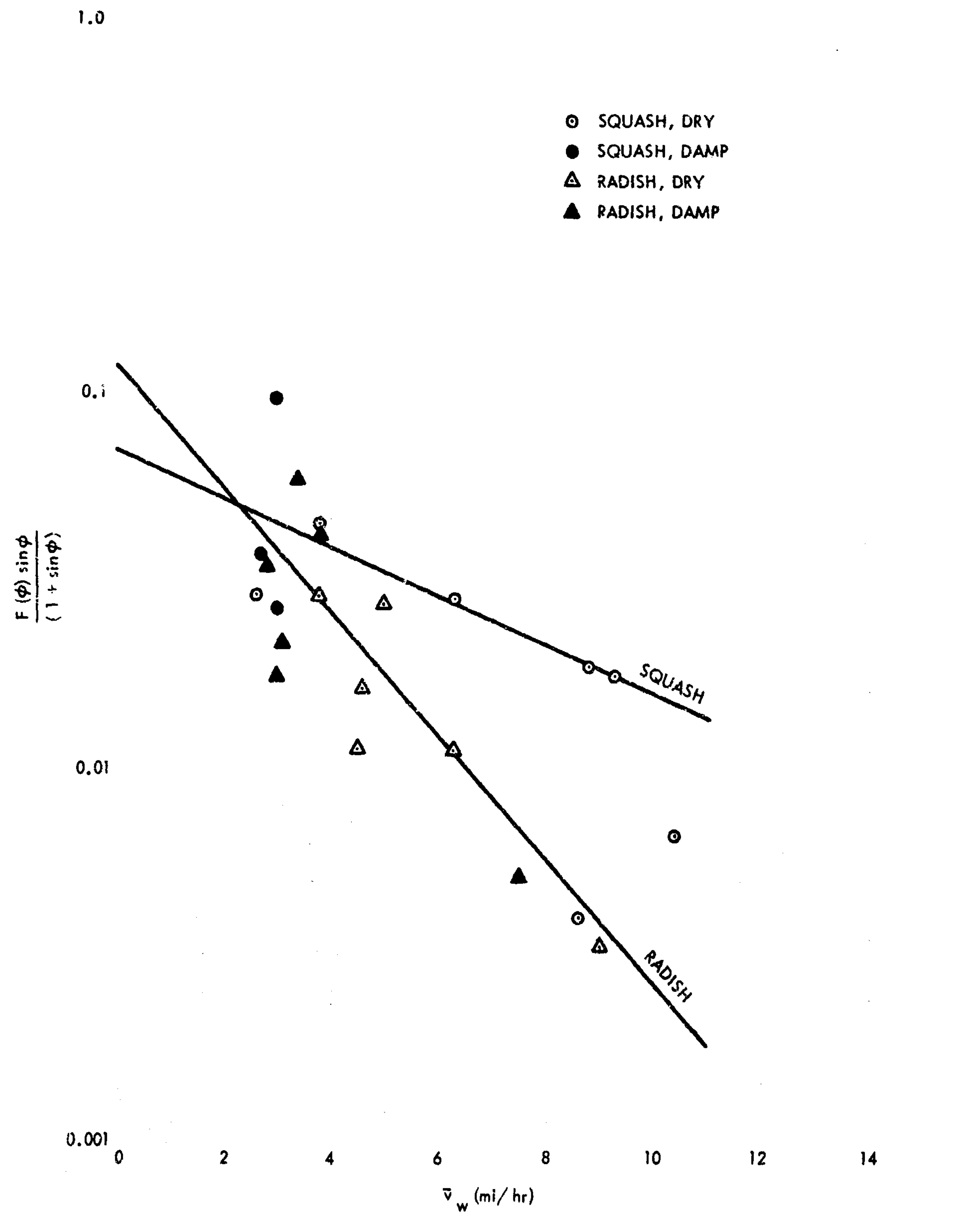


Figure 12

VARIATION OF F (ϕ) WITH α FOR BARLEY, OAT, AND WHEAT STALKS

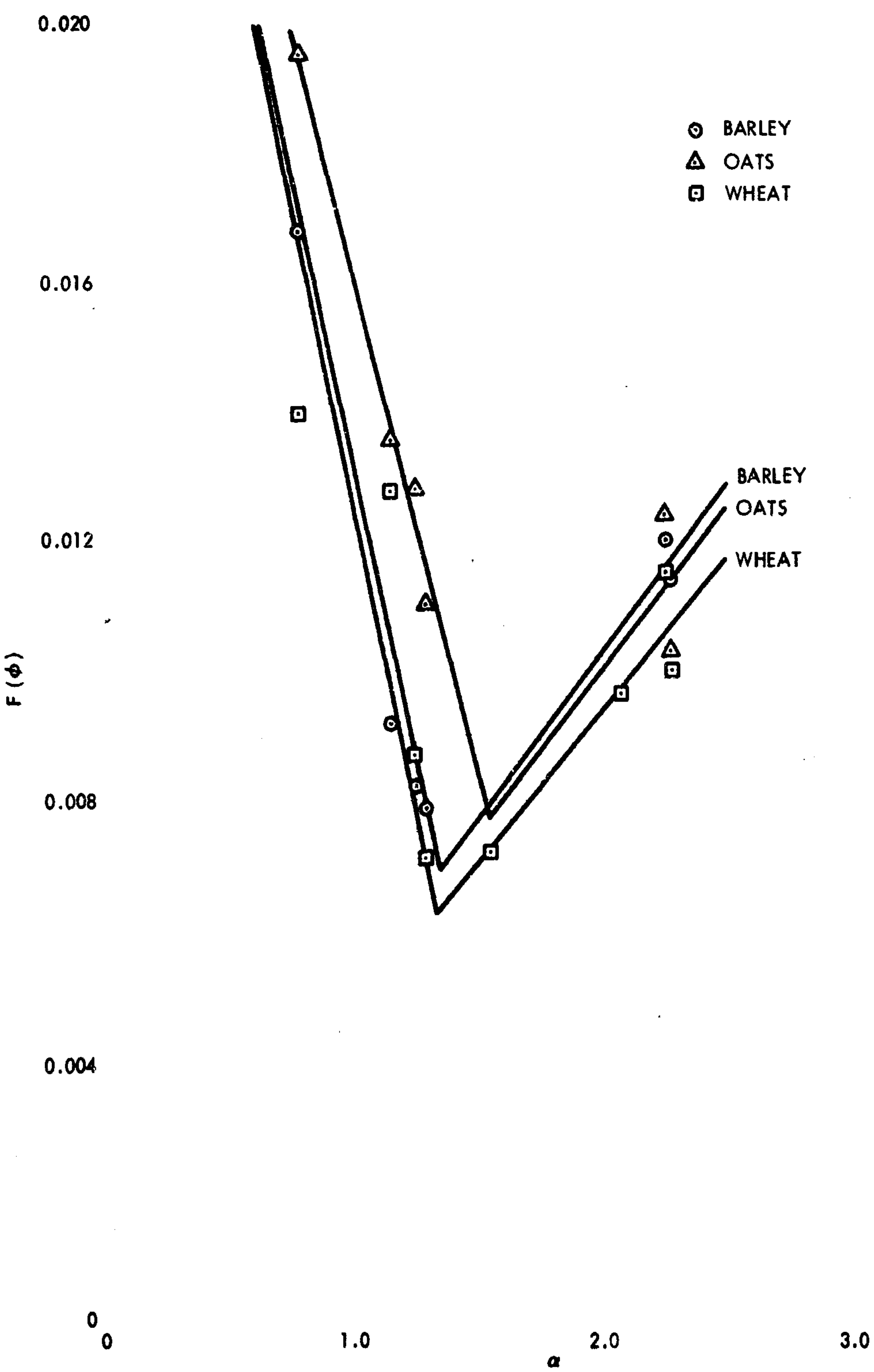


Figure 13

VARIATION OF F (ϕ)/α WITH WIND SPEED FOR BARLEY, OAT, AND WHEAT HEADS

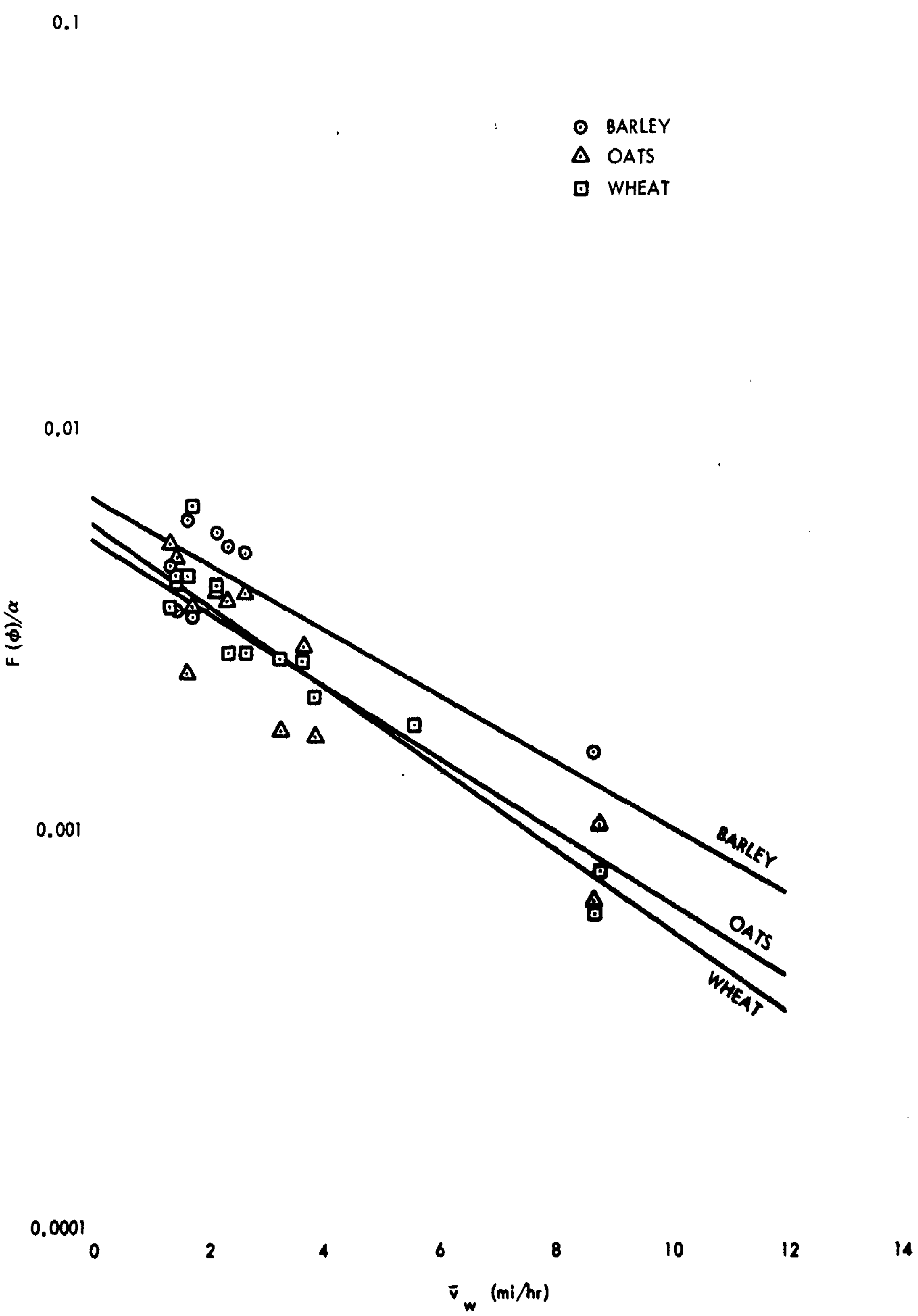


Table 18

REDUCED VALUES OF Ψ_r FOR RAIN-WEATHERED FOLIAR SAMPLES

Plant Type	Inches of Rain: 0.01[a]	0.02	0.03	0.04	0.07	0.08	0.11	0.13	0.14	0.15	0.16	0.18	0.20	0.23	0.25	0.30	0.34	0.35	0.43	0.48	0.54	0.77	1.03	1.20	1.48
Bean	0.7[illegible] 0.[illegible] 1.0			0.282[b] 0.456[b] 0.192[b]	0.5[illegible] 0.935	0.675	0.390	0.810 0.737	0.616	0.732[e] 4.12[c]			0.226 0.127	0.636		0.528[e]							8.96[c]		
Beet	0.7[illegible]					0.794		0.436 0.198	0.156				0.598[e] 0.298												
Bougainvillea			0.[illegible]								0.348														
Cabbage	1.0 0.730	0.[illegible]7				1.31[e]	1.02[e]	0.471 0.519	0.338				0.521 0.409	1.34[c]		0.129									
Carrot	1.34				1.30[e]		0.254	0.757 0.623	0.254				0.495 0.260	1.06[c]											
Corn					0.827	0.856				0.469					0.874[c]	0.193							4.09[c]		
Cypress, Italian													0.908[e]												
Geranium	1.18		0.[illegible]3 0.730								0.399		0.380												0.0253
Grass (Quincy pasture)							0.0593[b,e]					0.249													
Grass (barley)										0.232					0.180	0.0283									
Grass (oats)										0.451					0.0368	0.0318							0.00853		
Grass (rye)										0.126					0.0516	0.196							0.0229		
Grass (wheat)										0.326 0.396					0.198	0.0256							0.0304		
Lettuce				0.4[illegible][b]	3.34[c]	1.29[e]	0.520[b] 0.214	0.341 0.293	0.144			0.538	0.306 0.225	0.554											
Onion						0.562																			
Pepper			0.[illegible]2		0.[illegible]4																				
Poppy																			0.164[d]			0.0624[d]			
Potato	1.10			0.519[b] 0.361[b]		0.377	0.4[illegible]	0.374 0.368	0.433			0.260	0.124 0.468	0.491			0.0457 0.172								
Rose													0.600[e]												
Squash										1.79[c]						1.07[c]						0.0703	17.8[c]		
Tomato				0.300[b] 0.309[b]		0.412				2.01[c]															
Barley (stalks)																		0.294	0.0480		0.0694	0.0144		0.0187	
Barley (heads)																		0.0884	0.0995		0.0252	0.0209		0.0188	
Oats (stalks)																		0.0667	0.0994		0.0868	0.0386		0.0136	
Oats (heads)																		0.0199	0.0126		0.0195	0.0174		0.00644	
Rye (stalks)																		0.127			0.0728				
Rye (heads)																		0.0173			0.0324	0.0236			
Wheat (stalks)																		0.0586	0.0698		0.0282	0.0982		0.0104	
Wheat (heads)																		0.0540	0.0402		0.0496	0.0132		0.00756	
Camphor											0.269 0.213									0.0457 0.124 0.204					
Orange											0.317		0.755[e]												0.00831
Mean Value	0.[illegible]	0.[illegible]7	0.707	0.331[b]	0.746	0.[illegible]	0.3[illegible]	0.456	0.299	0.304	0.302	0.326	0.290	0.560	0.0907	0.0695	0.0886	0.0503	0.0598	0.103[e]	0.0421	0.0311	0.0181	0.0116	0.0145
Mean Value (grasses)							0.0593[b]			0.279		0.249			0.0907	0.0461							0.0181		
Mean Value (grain heads)																		0.0358	0.0369		0.0298	0.0184		0.00970	
Mean Value (grain stalks)																		0.110	0.0693		0.0593	0.0379		0.0138	

a Accepted values with negligible wind weathering are for $\Psi_r \leq 0.75$, calculated value of k_w large, or both.
b Deposit with rain
c Foliage with splashed-up soil (Data not used in calculation of mean values).
d α = 0.41 and 0.88, respectively, for Ψ_r = 0.164 and 0.0624
e Value not used in calculation of mean values

Figure 14

VARIATION OF $\ln \Psi_r R$ WITH R FOR SEVERAL GRASSES AND LEAF TYPES

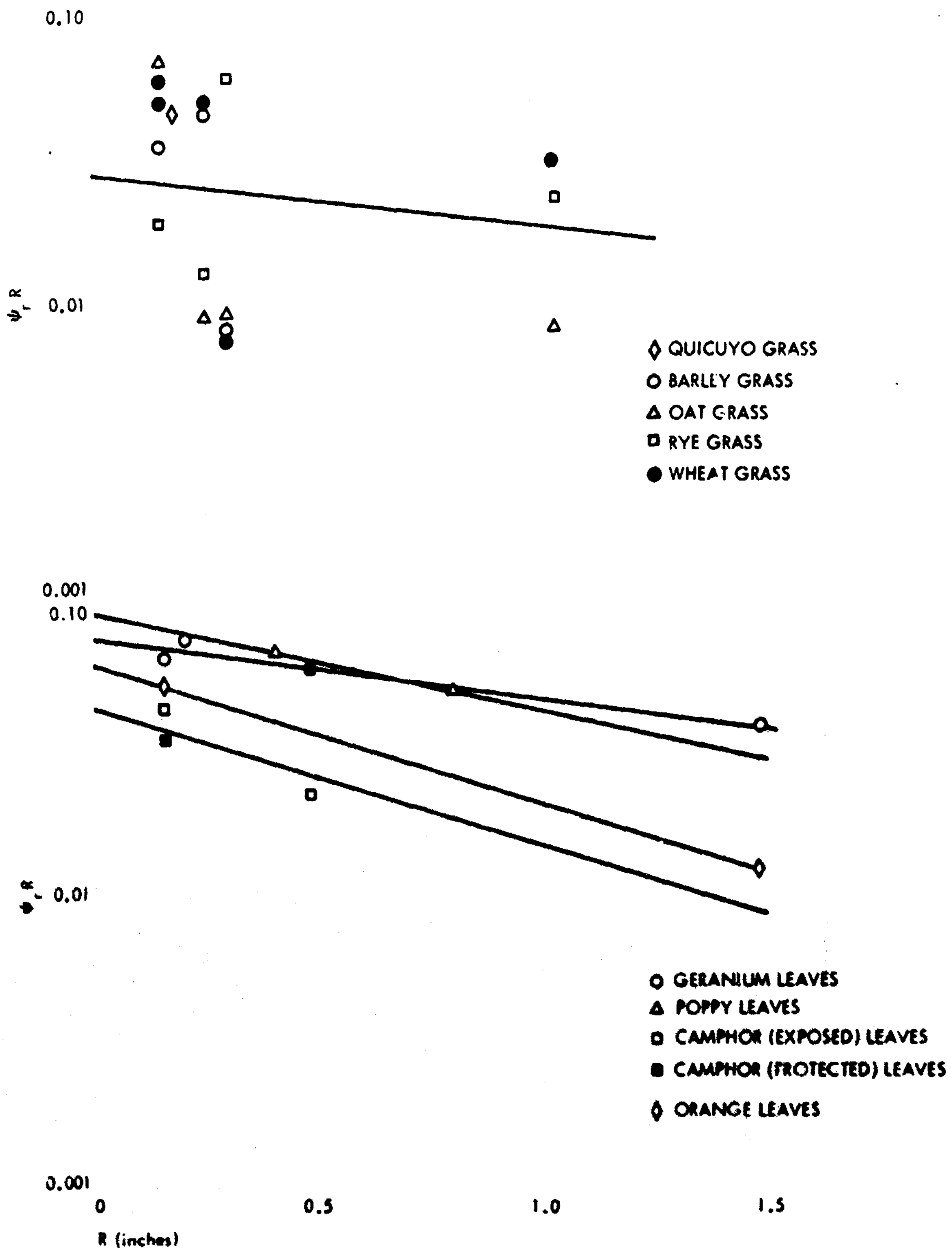


Figure 15

VARIATION OF $\ell n\ \Psi_r R$ WITH R FOR GRAIN STALKS AND GRAIN HEADS

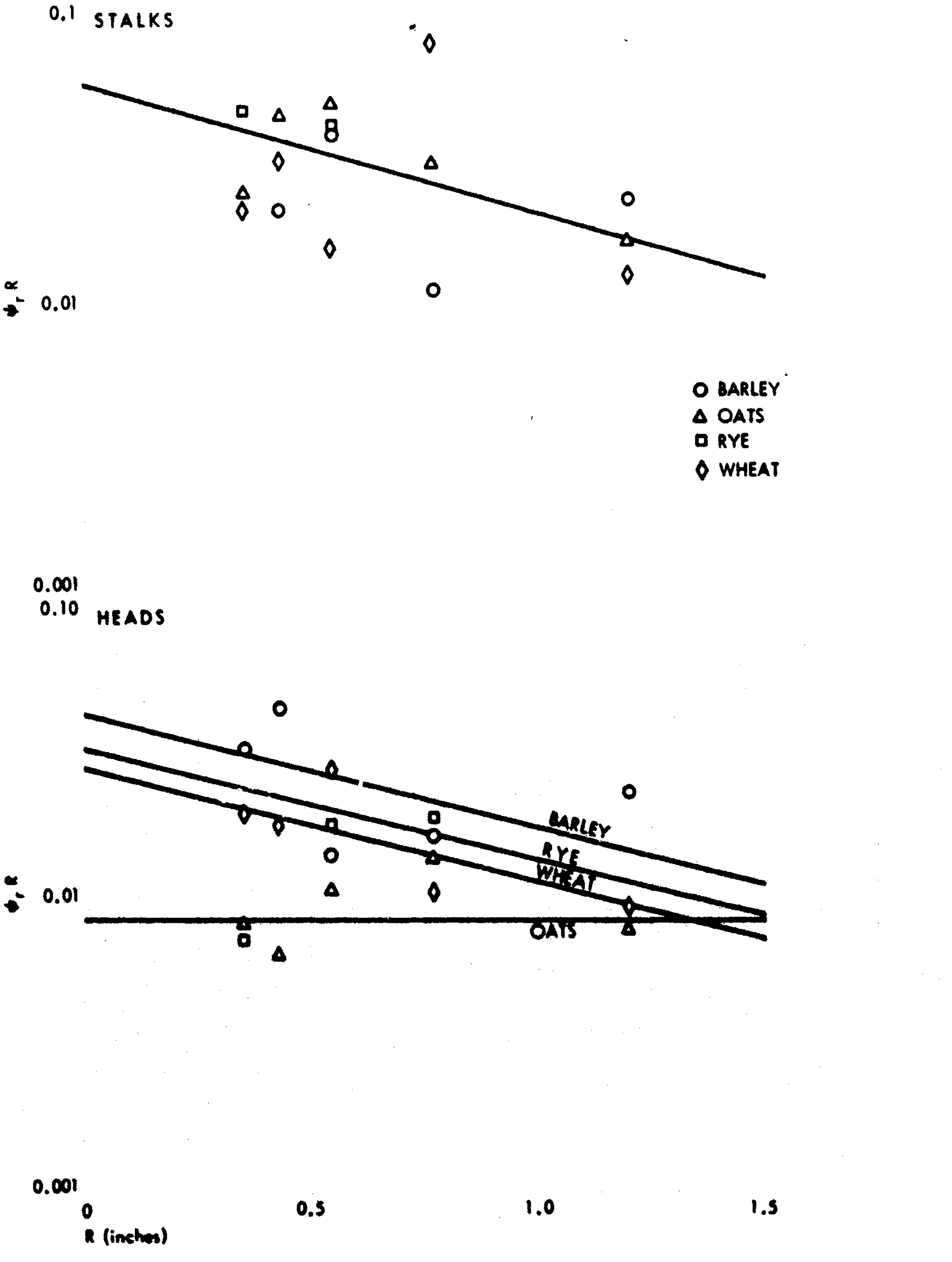


Table 19

CALCULATED VALUES OF Y_r^o FOR RAIN-WEATHERED FOLIAR SAMPLES

		Inches of Rain																				
Plant Type	b_v ([illegible])	0.06	0.07	0.09	0.11	0.12	0.14	0.15	0.16	0.18	0.20	0.25	0.30	0.35	0.43	0.48	0.54	0.77	1.03	1.20	1.48	Mean Value
Bean	([illegible])	[illegible] [illegible] [illegible]	[illegible] [illegible]	[illegible]	[illegible]	[illegible] [illegible]	[illegible]	0.1119			0.0657 0.0310											0 0693
Beet	([illegible])			[illegible]		[illegible] [illegible]	0 0251				0.1460 0.0728											0 0584
Bougainvillea	([illegible])								0 0654													0 0654
Cabbage	1 43					[illegible] [illegible]	[illegible]				0 1387 0.1089		0.0595									0 0824
Carrot	([illegible])				[illegible]	[illegible] [illegible]	[illegible]				0 1257 0.0640											0 0744
Corn	[illegible]		[illegible]	[illegible]				[illegible]					0.0863									0 0863
Geranium	[illegible]								[illegible]		0.0836										0 0759	0.0759
Grass ([illegible])	[illegible]				[illegible]					0 0482												0.0482
Grass (barley)	[illegible]							[illegible]				0.0497	0.0096									0.0260
Grass (oats)	[illegible]							[illegible]				0.0102	0.0108						0.0133			0 0180
Grass (rye)	[illegible]							[illegible]				0 0143	0 0663						0 0356			0 0287
Grass (wheat)	[illegible]							[illegible] [illegible]				0.0547	0 0067						0 0472			0.0374
Lettuce	([illegible])	[illegible]			[illegible] [illegible]	[illegible] [illegible]	0 0232			0.1159	0.0747 0 0540											0 0502
Onion	([illegible])			[illegible]																		0 0553
Pepper	([illegible])		[illegible]																			0 0665
Poppy	[illegible]														0.0921[d]			0 0923[d]				0 0922
Potato	[illegible]	[illegible] [illegible]		[illegible]	[illegible]	[illegible] [illegible]	[illegible]			0 0560	0.0303 0 1143			0.0218[e] 0.082?[e]								0 0547
Rose	([illegible])										0 1480											0 1480
Squash	([illegible])																	0 0796				0 0796
Tomato	([illegible])	[illegible] [illegible]		[illegible]																		0 0406
Barley (stalks)	[illegible]													0 1457	0.0317		0.0641	0 0236		0 0741		0.0554
Oats (stalks)	[illegible]													0.0331	0.0656		0.080?	0.0639		0.0539		0 0570
Rye (stalks)	[illegible]													0.0629			0.0673					0 0652
Wheat (stalks)	[illegible]													0 0290	0.0460		0.0261	0.1626		0 0412		0 0472
Barley (heads)	[illegible]													0.0419	0.0620		0.0217	0.0313		0 0636		0.0408
Oats (heads)	[illegible]													0.0070	0.0054		0 0105	0.0134		0.0077		0.00837
Rye (heads)	[illegible]													0.0082[c]			0.0279	0.0353				0.0314
Wheat (heads)	[illegible]													0.0256	0.0251		0.0428	0 0198		0.0256		0.0268
Camphor	([illegible]) ([illegible]) ([illegible])								[illegible][f] [illegible][g]							0.0367[f] 0.0595[g] 0.0979[c]						0.0433 0.0451
Orange	[illegible]								[illegible]												0.0602	0.0602
All grasses																						0 0282
All grains (stalks)																						0 0543
All plants (b_v = [illegible])																						0 0579

a Values in parentheses are selected values
b [illegible]
c [illegible]
d [illegible]
e [illegible]
f [illegible]
g [illegible]

Table 20

SUMMARY OF AVERAGE OR MEAN VALUES
OF FOLIAR CONTAMINATION WEATHERING EQUATION PARAMETERS

Plant	k_w (mi^{-1})	σ_w (%)	y_r^o	σ_r (%)	k_r (mi^{-1})	C^o_{PNR} (gm/gm)	σ_c (%)	Reference Conditions
Bean	0.0318	84.5	0.0693	44.8	1.00	0.0393	32.6	
	0.00347	-						Old deposit
Beet	0.0318	98.0	0.0584	66.7	1.00	0.0281	40.9	
	0.00207	85.1						Old deposit
Bougainvillia	0.00265	-	0.0654	-	1.00	0.0350	35.7	
Cabbage	0.0194	98.4	0.0824	30.6	1.43	0.0256	53.1	
	0.00190	-						Old deposit
Carrot	0.0260	51.0	0.0744	49.3	1.20	0.0299	33.8	
	0.00163	-						Old deposit
Corn	0.0311	73.7	0.0863	1.2	1.32	0.0845	54.8	
	0.00242	31.3						Old deposit
Cypress, Italian	0.0279	-	-	-	-	0.0199	43.7	
Gardenia	0.0125	-	-	-	-	0.0137	19.5	
Geranium	0.0396	-	0.0759	10.2	0.477	0.0408	45.2	
Grass (quicuyo pasture)	0.0149	-	0.0482	-	0.399	0.0380	33.2	
Grass (barley)	0.0682	22.0	0.0260	94.5	0.399	0.0298	43.6	
Grass (oats)	0.0652	51.4	0.0180	99.6	0.399	0.0298	12.1	
Grass (rye)	0.0262	33.1	0.0287	69.5	0.399	0.0849	45.8	
Grass (wheat)	0.0640	55.3	0.0374	79.3	0.399	0.0314	58.0	
Lettuce	0.0261	74.0	0.0502	48.0	1.00	0.0512	40.2	
	0.00086	-						Old deposit

Table 20 (continued)

Plant	k_w (mi^{-1})	σ_w (%)	Y_r^o	σ_r (%)	k_r (mi^{-1})	C^o_{PNR} (gm/gm)	σ_c (%)	Reference Conditions
Onion	0.0374	73.4	0.0553	-	1.00	0.0185	49.5	
	0.00157	-						Old deposit
Pea	0.0353	96.1	-	-	-	0.0118	23.5	
Pepper	0.0196	71.3	0.0665	-	1.00	0.0336	40.2	
	0.00048	76.3						Old deposit
Poppy	0.0420	-	0.0922	-	0.768	0.0172	29.3	
Potato	0.0207	108.3	0.0547	35.4	1.00	0.0335	46.4	
Radish	0.0267	30.5	-	-	-	0.0480	20.1	
Rose	-	-	0.148	-	1.00	0.0256	41.0	
Squash	0.0412	113.7	0.0796	-	0.500	0.0402	60.3	
Tomato	0.0237	57.3	0.0406	-	1.00	0.183	54.6	
	0.00546	35.4						Old deposit
Barley (stalks)	0.0370	7.8	0.0554	75.5	0.995	0.126	24.1	
Barley (heads)	0.0472	147.7	0.0408	43.0	0.864	0.104	38.0	
Oats (stalks)	0.0458	44.2	0.0570	27.0	0.995	0.0482	25.4	
Oats (heads)	0.0669	74.0	0.00837	32.3	0.0	0.0109	28.7	
Rye (stalks)	0.0353	1.4	0.0652	3.3	0.995	0.0197	51.6	
Rye (heads)	0.0527	25.6	0.0314	12.5	0.864	0.0439	23.1	
Wheat (stalks)	0.0310	30.7	0.0472	64.1	0.995	0.0371	74.9	
Wheat (heads)	0.0674	77.8	0.0268	20.6	0.864	0.0565	58.4	
Avocado	0.0221	34.8	-	-	-	0.0102	28.5	
Camphor	0.0255	22.6	0.0433	19.1	1.07	0.0181	27.2	
Grapefruit	0.0352	60.6	-	-	-	0.00655	24.4	
Juniper	-	-	-	-	-	0.00599	18.4	
Laurel	0.0199	-	-	-	-	0.0246	14.2	

Table 20 (concluded)

Plant	k_w (mi^{-1})	σ_w (%)	Y_r^o	σ_r (%)	k_r (mi^{-1})	C^o_{PNR} (gm/gm)	σ_c (%)	Reference Conditions
Orange	0.00905	28.0	0.0602	-	1.07	0.0160	37.9	
Pine	-	-	-	-	-	0.00601	41.4	
Fine Grasses	0.026	33.0	0.028	86.0	0.40	0.061	40.0	
Coarse Grasses	0.066	43.0	0.028	86.0	0.40	0.030	34.0	
Grains (stalks)	0.037	37.0	0.054	56.0	1.0	0.058	44.0	
Grains (heads)[a]	0.056	84.0	0.033	26.0	0.86	0.050	40.0	
Vegetables[b]	0.028	77.0	0.058	50.0	1.0	0.033	39.0	
Tree Leaves	0.026	39.0	0.051	25.0	1.1	0.014	24.0	

a Barley, rye, wheat
b Bean, beet, lettuce, onion, pea, pepper, potato, radish, tomato

Figure 16

FREQUENCY DISTRIBUTION OF k_w VALUES: BEAN, BEET, CORN, AND POTATO

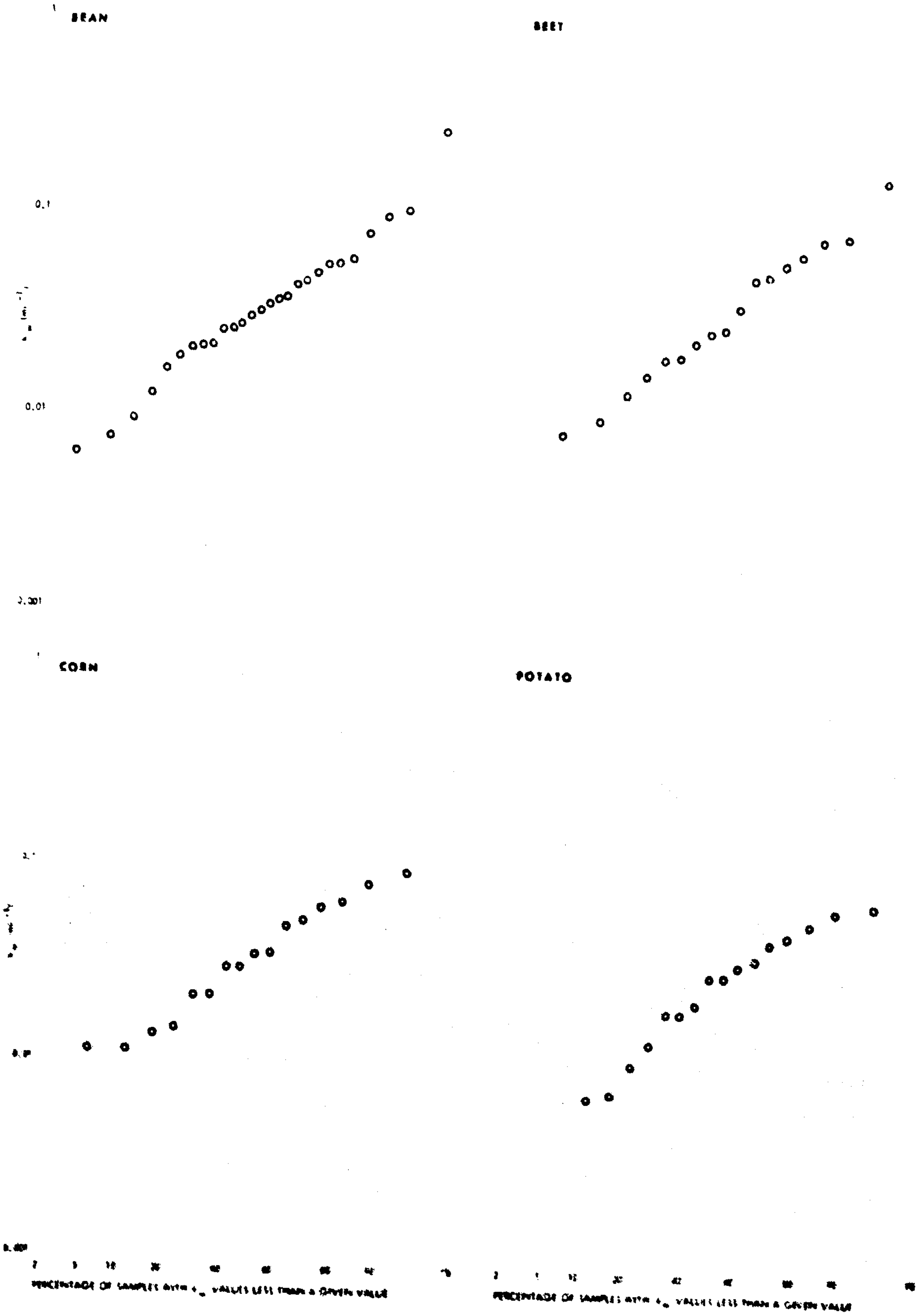


Figure 17

FREQUENCY DISTRIBUTION OF k_w VALUES: SQUASH, BARLEY HEADS, OAT HEADS, AND WHEAT HEADS

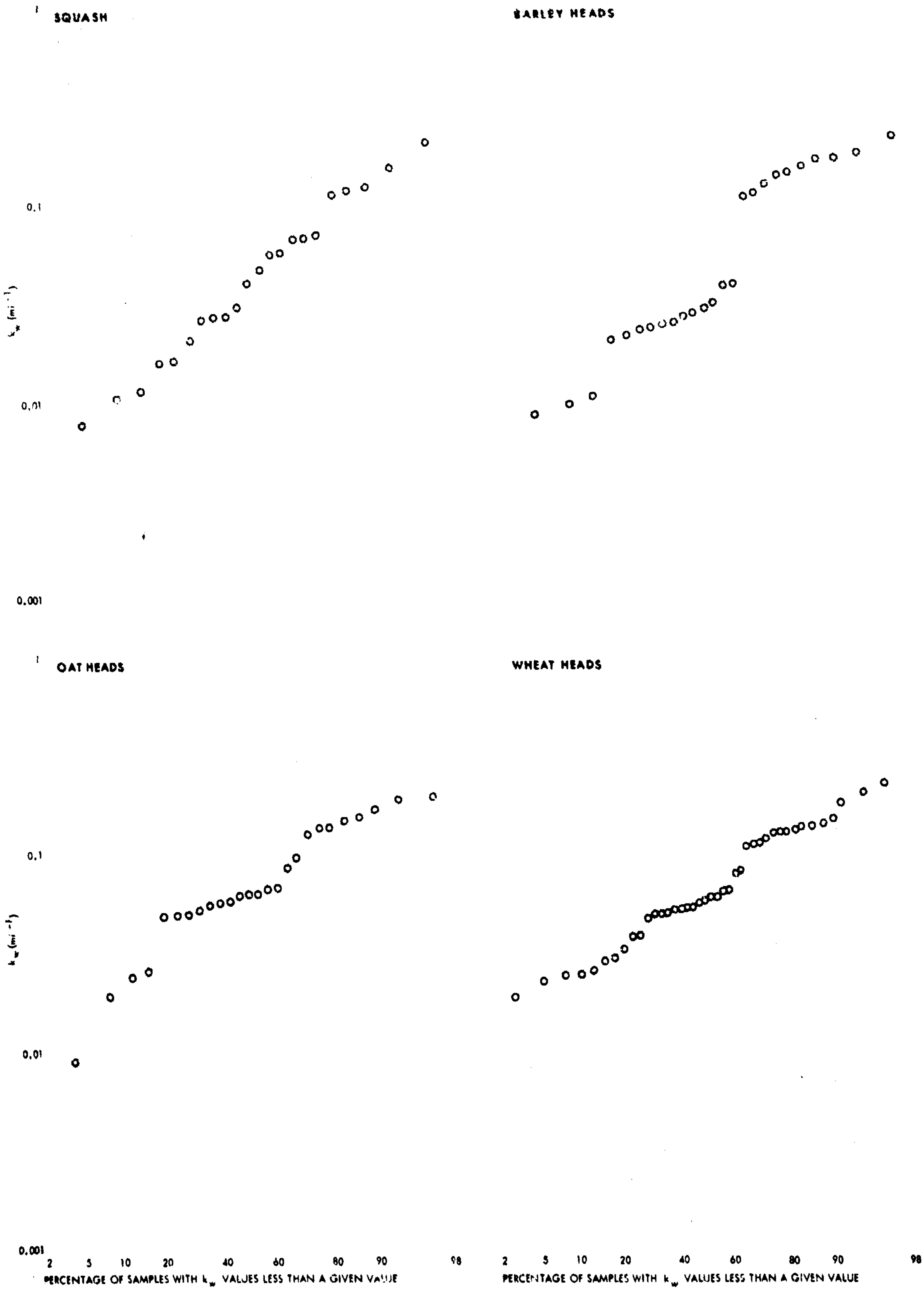


Table 21

DERIVED VALUES OF PLANT GROWTH EQUATION PARAMETERS

Plant	Station	m'_o (gm/plant)	A (day^{-1})	$B = a_T$ (day^{-2})	t_m (days)	m_p^o (gm/plant)
Bean-1[a]	14	0.0776	0.0877	5.30×10^{-4}	82.7	2.87
Bean-2[a]	14	0.0441	0.0889	5.09×10^{-4}	87.2	2.13
Bean-1,2[a]	06	0.0466	0.0765	4.94×10^{-4}	77.4	0.895
Bean-3[a]	06	0.0530	0.0500	1.48×10^{-4}	168	3.48
Bean-4,5,6[b]	14,06	0.0488	0.0563	0.838×10^{-4}	336	624.0
Beet-1	14,06	0.1023	0.0409	0.944×10^{-4}	217	8.77
Cabbage-1	14	1.71×10^{-3}	0.145	4.83×10^{-4}	150	90.8
Cabbage-1	06	4.33×10^{-4}	0.162	5.62×10^{-4}	144	49.4
Cabbage-2	14	1.85×10^{-3}	0.149	4.86×10^{-4}	154	187.0
Carrot-1	06	1.80×10^{-3}	0.0647	1.41×10^{-4}	229	2.95
Carrot-2	14	5.00×10^{-4}	0.0803	1.75×10^{-4}	230	5.12
Carrot-3	06	8.48×10^{-4}	0.0782	2.26×10^{-4}	173	0.734
Corn-1[c]	14	$5/39 \times 10^{-4}$	0.169	6.59×10^{-4}	128	26.0
Corn-1	06	3.44×10^{-3}	0.132	4.53×10^{-4}	146	50.0
Corn-2	06	2.79×10^{-3}	0.142	4.70×10^{-4}	152	136.8
Corn-3	14	1.14×10^{-3}	0.136	4.30×10^{-4}	158	51.5
Corn-3	06	1.24×10^{-3}	0.145	4.79×10^{-4}	151	69.0
Corn-4	14	2.07×10^{-3}	0.148	4.94×10^{-4}	(150)[d]	140.2

Table 21 (continued)

Plant	Station	m_o' (gm/plant)	A (day^{-1})	$B = a_T$ (day^{-2})	t_m (days)	m_p^o (gm/plant)
Lettuce-1	06	3.05×10^{-4}	0.0955	2.73×10^{-4}	(175)	1.30
Lettuce-2	14	4.52×10^{-5}	0.139	3.87×10^{-4}	180	12.4
Lettuce-2	06	4.96×10^{-3}	0.0647	1.85×10^{-4}	(175)	1.43
Onion-1	14	3.00×10^{-3}	0.0410	0.484×10^{-4}	424	18.0
Onion-1	06	1.24×10^{-3}	0.0491	0.845×10^{-4}	291	1.56
Pea-1	14	0.0258	0.0687	9.87×10^{-6}	3,480	-
Pea-1	06	4.15×10^{-3}	0.142	7.00×10^{-4}	101	5.51
Pea-2	14	4.66×10^{-3}	0.177	10.13×10^{-4}	87	10.5
Pea-2	06	5.97×10^{-3}	0.170	9.40×10^{-4}	90	12.5
Pepper-1	14,06	3.53×10^{-4}	0.0663	1.20×10^{-4}	275	3.13
Potato-1	14	0.0920	0.0538	1.99×10^{-4}	(135)	3.46
Potato-1	06	0.222	0.0498	1.84×10^{-4}	(135)	6.37
Radish-1	14	5.40×10^{-3}	0.100	4.17×10^{-4}	(120)	2.18
Radish-1	06	0.0122	0.0797	3.32×10^{-4}	(120)	1.49
Squash-1,2,4	14,06	0.0205	0.0920	2.49×10^{-4}	185	100.2
Tomato-1,2,3,4[c]	14,06	1.82×10^{-4}	0.148	5.73×10^{-4}	129	2.56

Table 21 (concluded)

Plant	Station	m_o' (gm/plant)	A (day^{-1})	$B = a_T$ (day^{-2})	t_m (days)	m_p^o (gm/plant)
Barley-1	14	4.94×10^{-3}	0.106	4.54×10^{-4}	117	2.54
Barley-1	06	0.0103	0.0864	3.51×10^{-4}	123	2.10
Barley-2[e]	06	8.41×10^{-3}	0.0871	3.85×10^{-4}	113	1.16
Oats-1	14	0.0127	0.0800	3.14×10^{-4}	127	2.06
Oats-1	06	5.46×10^{-3}	0.107	4.46×10^{-4}	120	3.44
Oats-2[e]	06	3.21×10^{-3}	0.114	5.90×10^{-4}	97	0.826
Wheat-1	14	4.19×10^{-3}	0.0948	4.07×10^{-4}	116	1.04
Wheat-1	06	7.87×10^{-3}	0.0834	3.28×10^{-4}	127	1.57
Wheat-2	14	5.53×10^{-3}	0.117	5.85×10^{-4}	(100)	1.92
Wheat-2	06	3.66×10^{-3}	0.117	5.52×10^{-4}	(106)	1.80

a Bush beans

b Pole beans (bean-5, Station 06 excluded)

c Stunted plants

d Values in parentheses are selected values

e No heads emerged at 90 days after planting; leaves with rust infection (coefficients refer to the grass form)

Figure 18

VARIATION OF m_p WITH TIME AFTER PLANTING: CABBAGE AND CORN

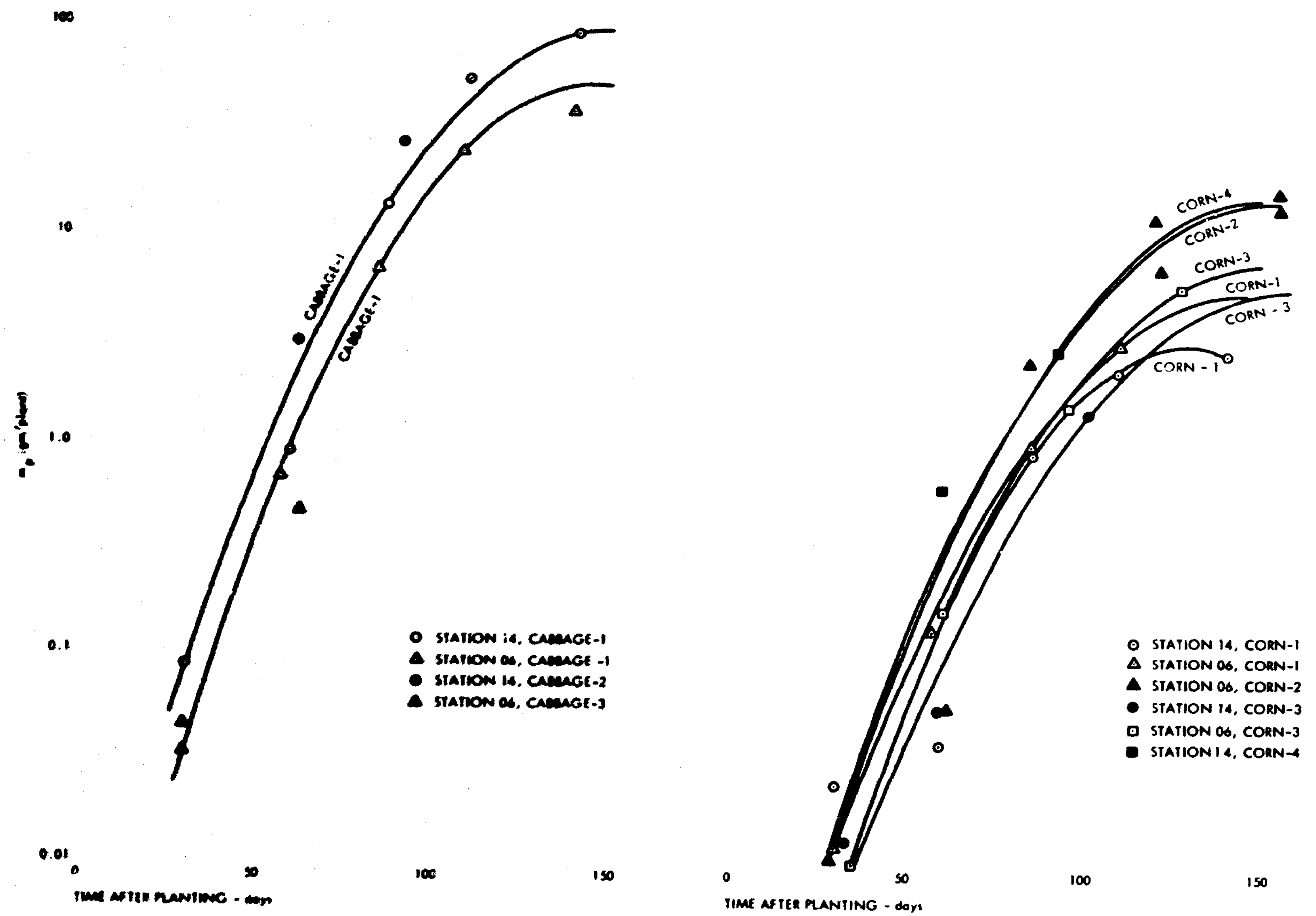


Figure 19

VARIATION OF m_p WITH TIME AFTER PLANTING: ONIONS AND PEAS

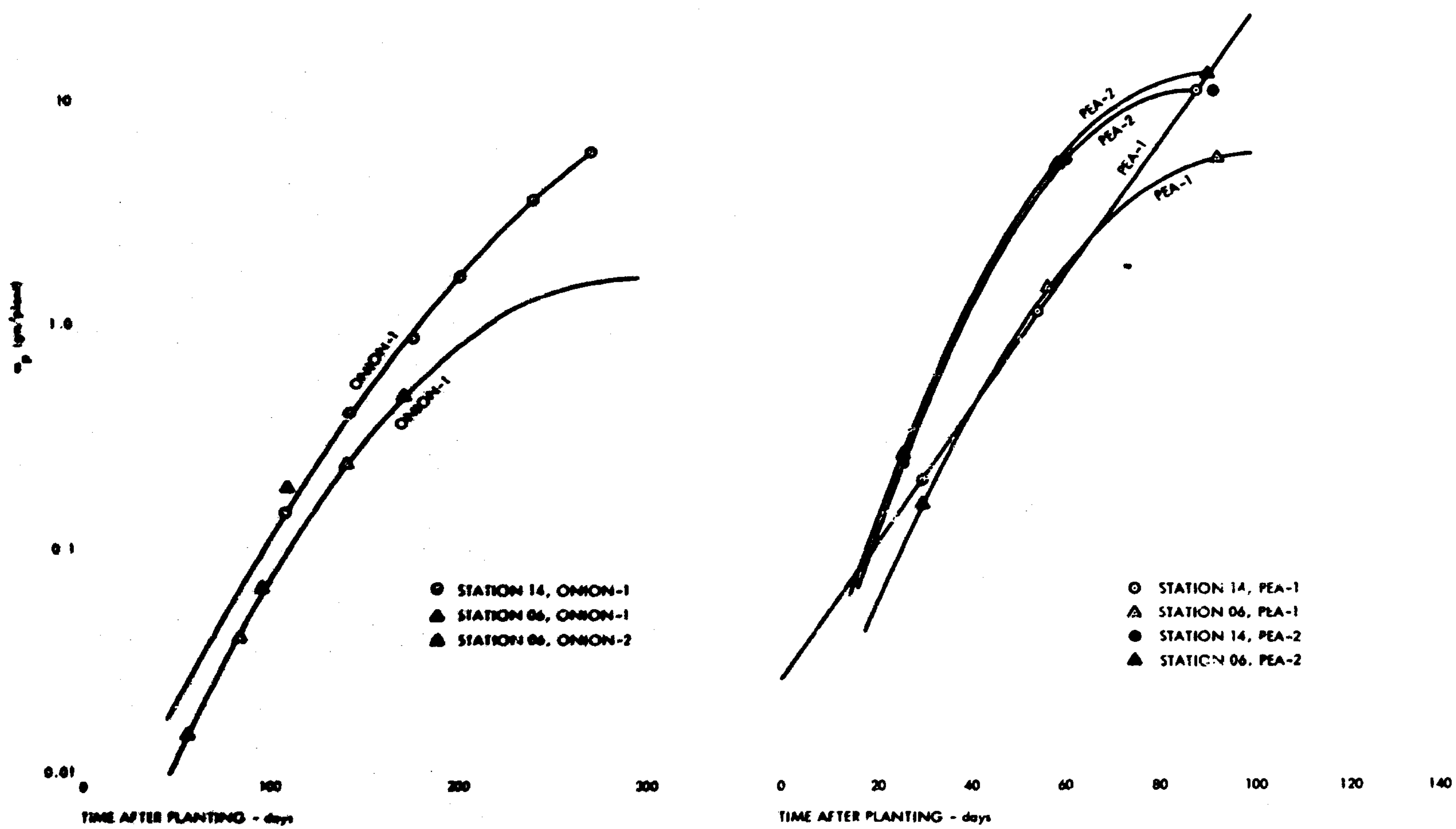


Figure 20

VARIATION OF m_p WITH TIME AFTER PLANTING: SQUASH AND BARLEY STALKS

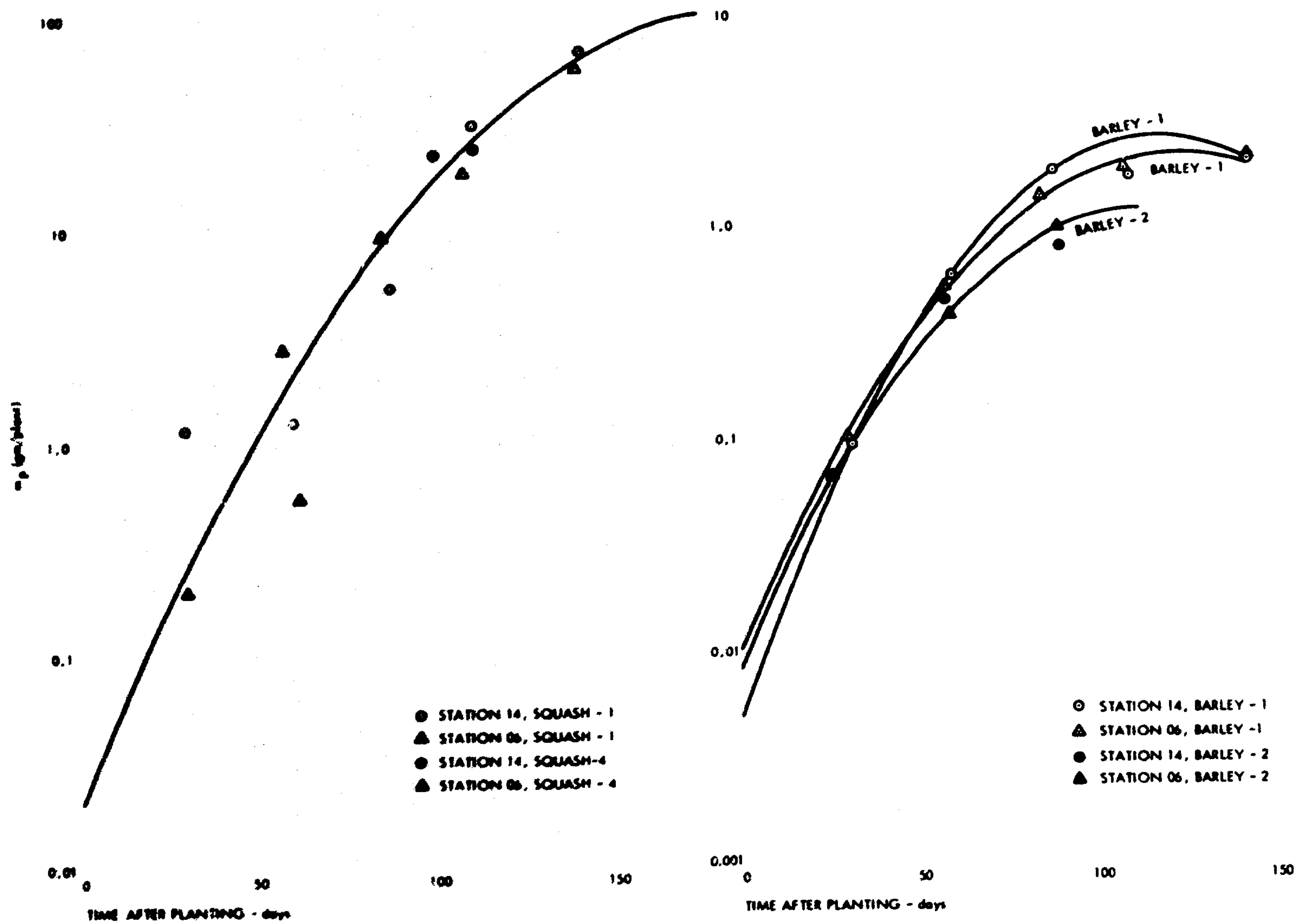


Figure 21

VARIATION OF m_p WITH TIME AFTER PLANTING: OAT AND WHEAT STALKS

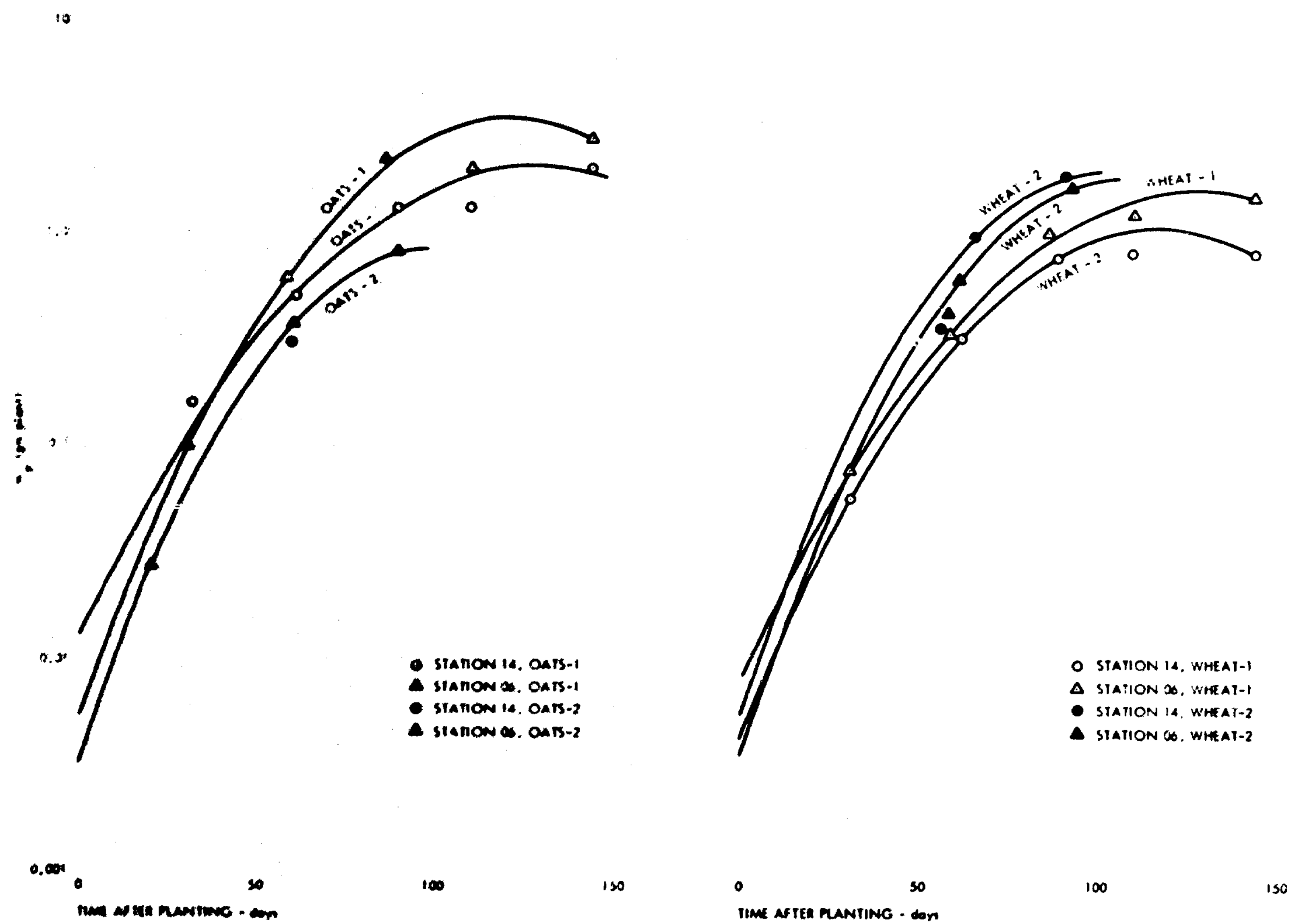


Table 22

DERIVED VALUES OF SEED FORMATION EQUATION PARAMETERS

Plant	Station	m_f^o (gm/head)	a_T (days^{-2})	t_o (days)
Barley-1	14,06	1.063	1.46×10^{-4}	34.3
Oats-1	14	0.980	1.14×10^{-4}	63.7
Oats-1	06	1.26	1.21×10^{-4}	68.0
Wheat-1	14	0.470	1.24×10^{-4}	66.7
Wheat-1	06	0.664	1.24×10^{-4}	68.4
Wheat-2	14	0.841	1.24×10^{-4}	36.9
Wheat-2	06	0.759	1.24×10^{-4}	36.9

Figure 22

VARIATION OF m_f WITH TIME AFTER PLANTING FOR BARLEY, OAT, AND WHEAT HEADS

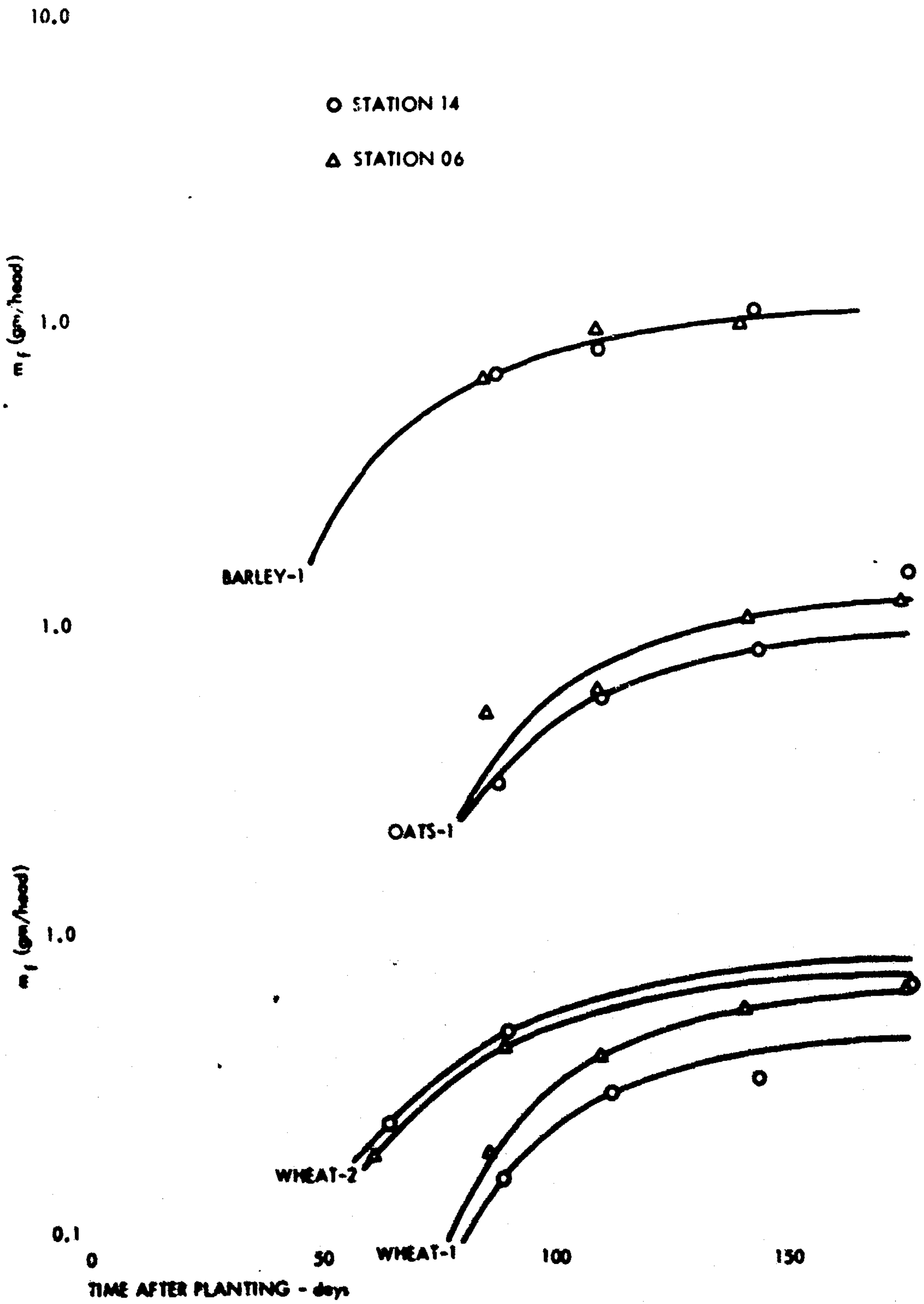


Table 23

SUMMARY OF SPECIFIC AREA CORRELATION EQUATION COEFFICIENTS

Plant	Part	Sample Number	S_L^o (sq ft/gm)	n_L	Sample Description
Bean	leaf	average	0.0877	(0.250)[a]	Mature plants
	leaf	average	0.144	(0.250)	Young plants (11 days)
	pod	average	0.0154	(0.260)	Average area
Beet	leaf	average	0.0744	(0.250)	Older plants (over 3 months)
Cabbage	leaf	average	0.139	0.265	Young plants, peripheral leaves of mature plants
	leaf	14834-1	0.136	0.251	Single leaf data, peripheral leaves
	leaf	14834-1	0.085	0.0	Head leaves, curled
Carrot	leaf	average	0.107	0.266	
Corn	leaf	14845-1	0.259	0.298	Single leaf data
	leaf	06559-1	0.295	0.352	Single leaf data
	leaf	average	0.232	0.327	Tasseled plants (12 leaves)
	stalk	average	0.0157	0.258	Tasseled plants
	tassel	average	0.295	(0.250)	Fully-developed tassel
Onion	stem	average	0.0484	0.200	

Table 23 (continued)

Plant	Part	Sample Number	S_L^o (sq ft/gm)	n_L	Sample Description
Pea	leaf	average	0.106	0.227	Regular and stem leaves
	pod	average	0.0162	0.260	Maximum area
	pod	average	0.0102	0.0	Minimum area
Pepper	leaf	average	0.0389	0.423	
	fruit	average	0.00263	(0.333)	
Potato	leaf	average	0.161	(0.250)	
Radish	leaf	average	0.109	(0.250)	
Squash	leaf	average	0.101	(0.250)	Mature plant
	fruit	average	0.0114	(0.333)	Small fruit (6)
	flower	average	0.0638	0.0	
Barley	leaf	06631-1	0.436	0.0	10 plants, 5 leaves each (61 days)
	leaf	06675-1	0.192	0.210	10 plants, 5-7 leaves each (90 days)
	stem	average	0.0426	0.181	
Oats	leaf	06630-1	0.316	0.0	10 plants, 4 leaves each (61 days)
	stem	06630-1	0.0323	(0.	
Wheat	leaf	14782-1	0.146	0.200	10 plants, 4 leaves each (65 days)
	leaf	14835-1	0.0582	0.381	10 plants, 4 leaves each (91 days)
	leaf	06629-1	0.327	0.0	10 plants, 4 leaves each (60 days), Colombian

Table 23 (concluded)

Plant	Part	Sample Number	S_L^o (sq ft/gm)	n_L	Sample Description
Wheat (continued)					
	stem	average	0.0223	0.221	
	heads	average	0.0226	(0.455)	New heads (65 days)
	heads	average	0.00805	0.455	Mature heads (90 days)
Avocado	leaf	average	0.155	0.139	Young new leaves
	leaf	average	0.0936	0.128	Older mature leaves
Camphor	leaf	average	0.109	0.136	Most shaded leaves
	leaf	average	0.0879	0.112	Exposed leaves
Grapefruit	leaf	average	0.102	0.146	Young new leaves
	leaf	average	0.0651	0.130	Older mature leaves
Juniper	twig	average	0.0678	(0.0)	
Laurel	leaf	average	0.140	0.126	
Pine	needle	average	0.0232	(0.0)	Mature needles

a Values in parentheses are selected values

Figure 23

VARIATION OF S_L WITH m_L FOR THE CABBAGE PLANT LEAVES

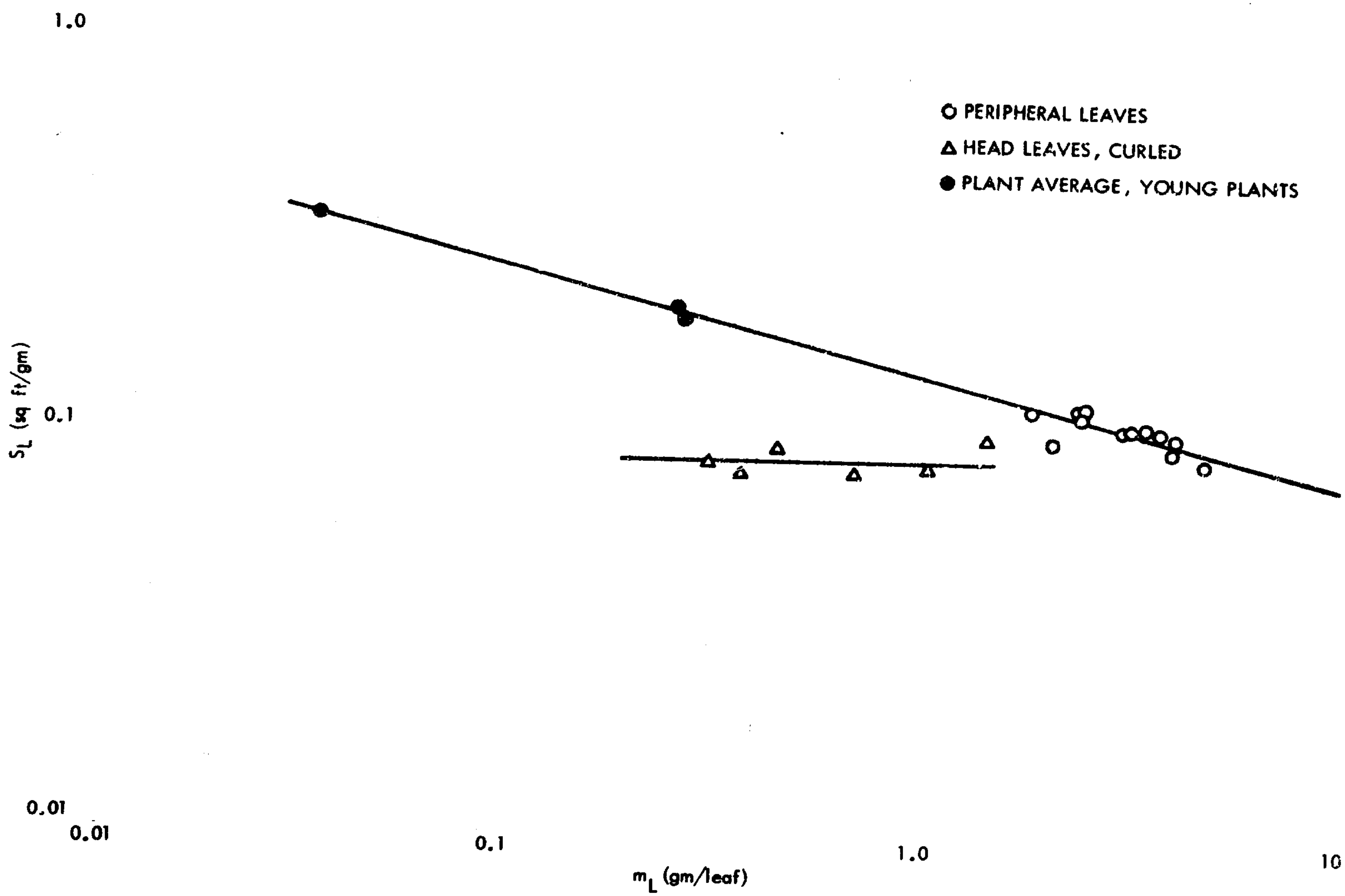


Figure 24

VARIATION OF S_L WITH m_L FOR THE AVOCADO TREE LEAVES

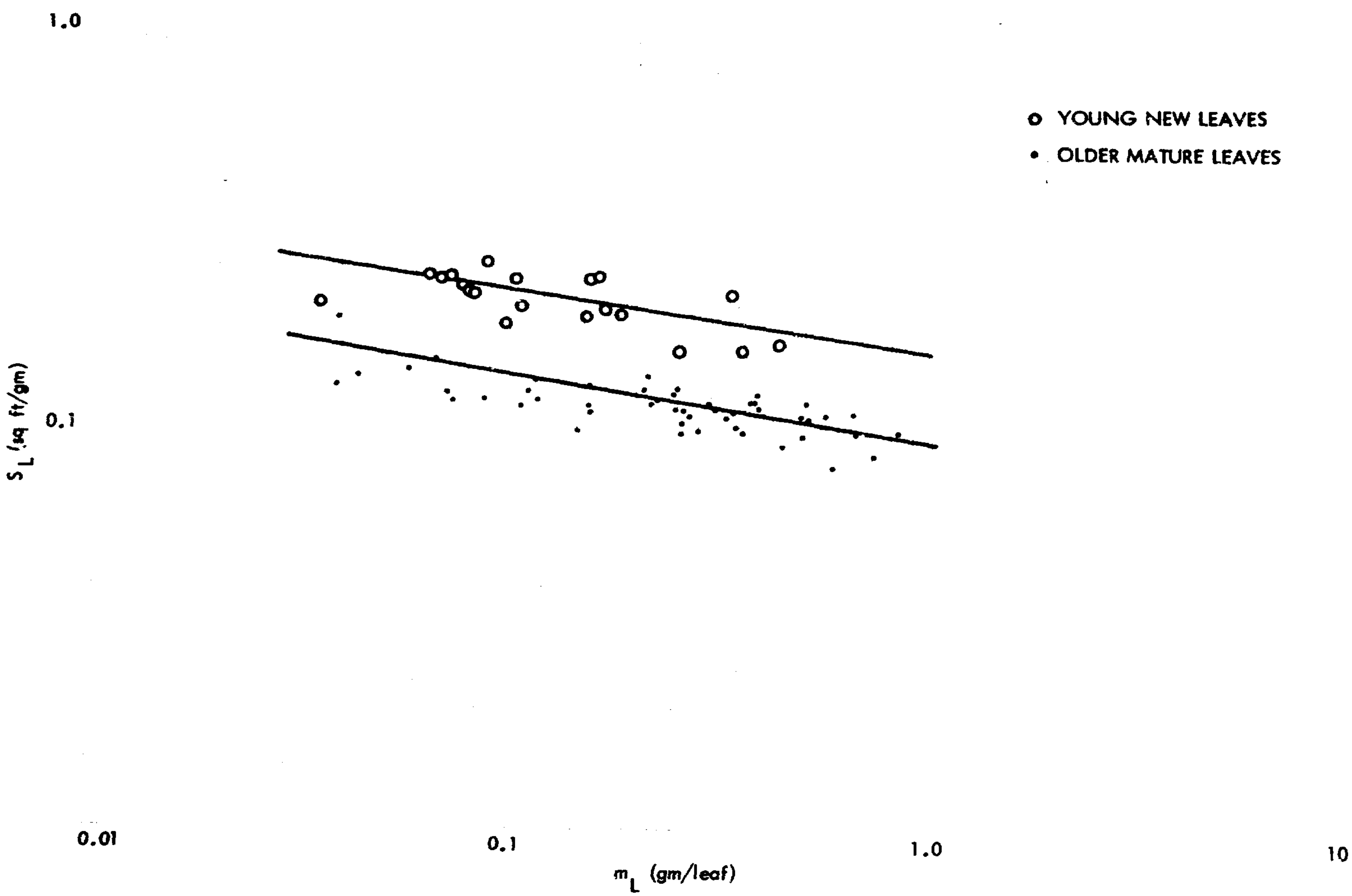


Figure 25

VARIATION OF S_L WITH m_L FOR THE GRAPEFRUIT TREE LEAVES

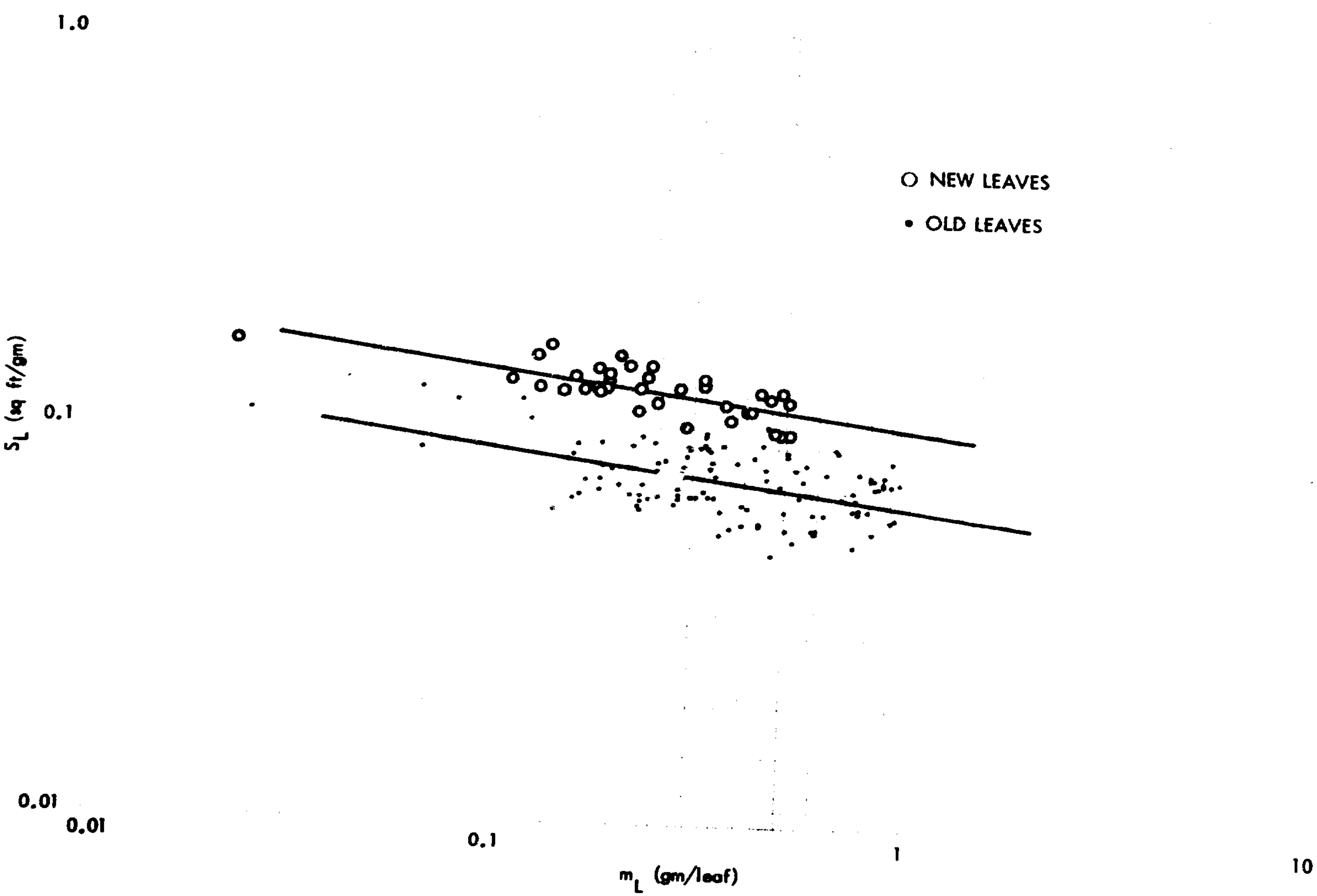


Figure 26

VARIATION OF S_L WITH m_L FOR THE LAUREL TREE LEAVES

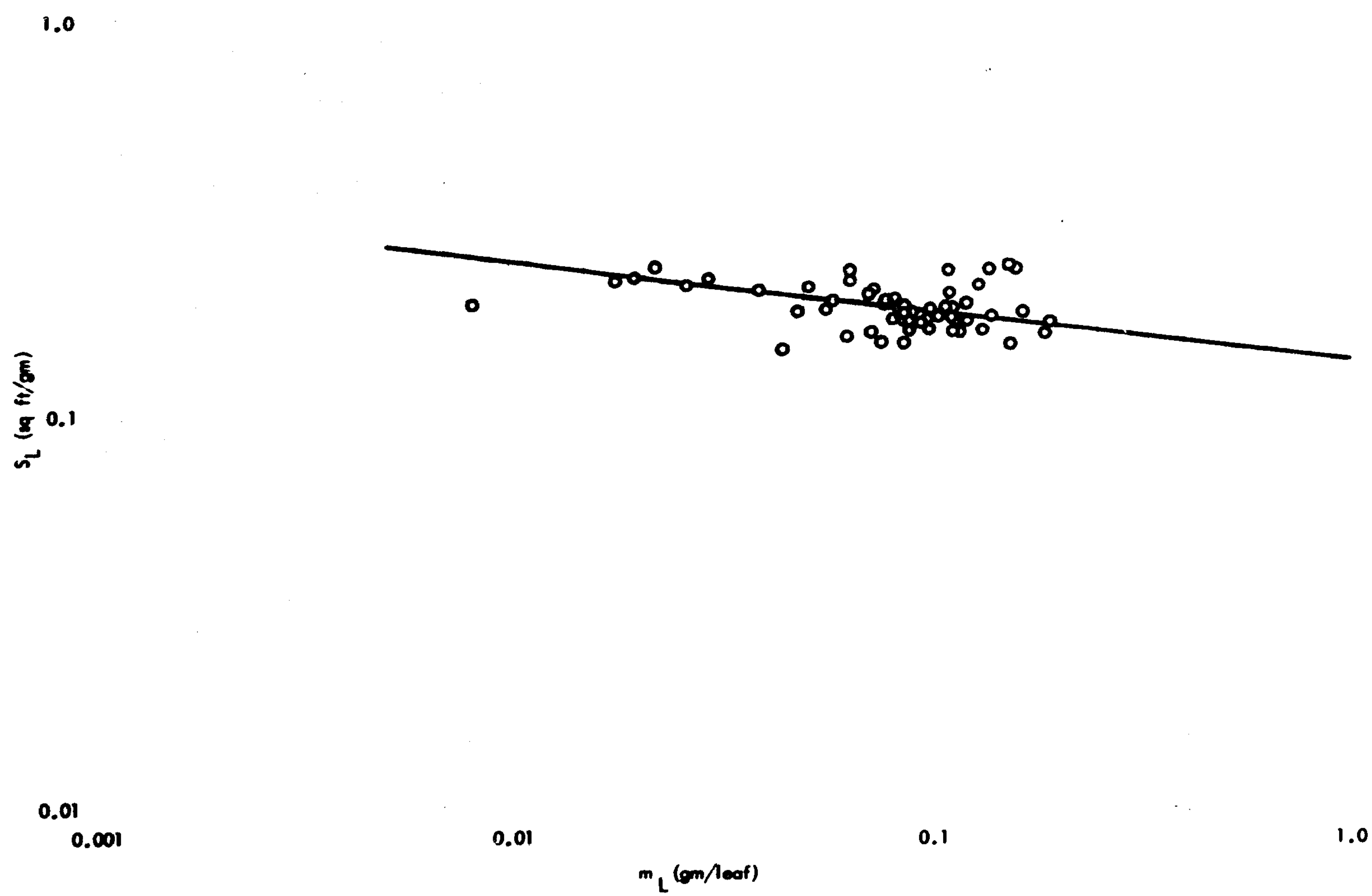


Table 24

GEOMETRIC AND OTHER CHARACTERISTIC TREE CANOPY PARAMETERS

Tree	$\bar{w}_L$ (gm/leaf)	N_L (no. leaves)	W_L (gm)	V_L (cu ft)	ρ_L (gm/cu ft)	a (ft)	b (ft)	h_t (ft)	h_b (ft)
Avocado	0.290	36,600	10,600	530	20[a]	5.0	5.0	15.4	5.4
Camphor	0.0697	22,100	1,540	113	13.6[b]	3.0	3.0	10.0	4.0
Grapefruit	0.326	1,344	438	20.3	21.6	1.61	1.88	5.2	1.4
Laurel	0.0940	27,900	2,620	168	15.6	3.42	3.42	10.5	3.6
Pine-2	0.0675	203,000	13,700	750	18.3[c]	4.4	18.5	24.8	6.3

a Assumed spatial density to be about the same as that of the grapefruit tree

b Estimated from ratio of mean values of $\beta \bar{v}_w$ for camphor and laurel and ρ_L for laurel

c Assumed one-half of the needle density of the end branches for the whole canopy volume

Table 25

ESTIMATED VALUES OF β FOR THE CAMPHOR AND LAUREL TREE FOLIAGE

Sample Number	α	x (ft)	y (ft)	z (ft)	z_o (ft)	r (ft)	$F(w_L)$	β (ft^{-1})	$\beta\bar{v}_w$ (mi/ft-hr)
1. Camphor									
06382-1,3	(1.5)[a]	-2.4	1.5	1.0	2.60	2.88	0.392	0.325	0.975
06383-1,3	(1.5)	-1.0	1.0	-2.6	1.98	4.60	0.185	0.367	1.101
06396-1,3	2.307	-2.0	2.0	1.0	1.87	2.88	0.828	0.0656	0.197
06396-1,3	2.307	-2.0	2.0	1.0	1.87	2.88	0.580	0.189	0.567*
06397-1,3	2.307	-2.0	1.0	-2.0	-1.13	3.96	0.341	0.272	0.816*
06397-1,3	2.307	-2.0	1.0	-2.0	-1.13	3.96	0.252	0.348	1.044*
06429-1,3	4.606	-2.4	1.0	-1.5	-0.98	5.32	0.351	0.197	0.749*
06450-1,3	2.112	0.0	1.0	-2.8	-2.82	2.45	0.432	0.342	1.060*
06517-1,3	(2.0)	0.0	1.0	-2.8	-2.82	2.56	0.579	0.213	0.980
06517-1	(2.0)	0.0	1.0	-2.8	-2.82	2.56	0.654	0.166	0.764
06540-1,3	(2.0)	0.5	1.0	-2.8	-3.03	1.60	0.879	0.0806	0.322
06540-1	(2.0)	0.5	1.0	-2.8	-3.03	1.60	0.858	0.0957	0.383
06592-1,3	2.089	0.5	1.0	-2.8	-3.02	1.50	0.653	0.266	0.878*
06592-1,3	2.089	0.5	1.0	-2.8	-3.02	1.50	0.931	0.0476	0.133
06592-1	2.089	0.5	1.0	-2.8	-3.02	1.50	0.552	0.396	1.307*
06592-1	2.089	0.5	1.0	-2.8	-3.02	1.50	0.753	0.189	0.529*
							Mean of	*values	0.833
2. Laurel									
15027-1	(0.7)	1.7	-1.7	-2.4	-4.77	1.90	0.726		
15028-1	(0.7)	1.7	1.7	-2.4	-4.77	1.90	0.264		
15029-1	(0.7)	-1.7	1.7	-2.4	-0.071	5.93	0.0271		
15030-1	(0.7)	-1.7	-1.7	-2.4	-0.071	5.93	0.169	0.443	0.886
15038-1	0.7283	1.7	1.7	-2.4	-4.77	1.90	0.418		

Table 25 (concluded)

Sample Number	α	x (ft)	y (ft)	z (ft)	z_o (ft)	r (ft)	$F(w_L)$	β (ft^{-1})	$\beta \bar{v}_w$ (mi/ft-hr)
				2. Laurel (continued)					
15039-1	0.7283	1.7	-1.7	-2.4	-4.77	1.90	0.405		
15040-1	0.7283	-1.7	-1.7	-2.4	-0.071	5.93	0.167		
15041-1	0.7283	-1.7	1.7	-2.4	-0.071	5.93	0.167		
15042-1	0.7283	0.0	0.0	-3.4	-3.42	5.53	0.0370	0.434	1.693
15052-1	(0.7)	0.0	2.4	-2.4	-2.42	3.92	0.547		
15052-1	(0.7)	0.0	2.4	-2.4	-2.42	3.92	0.409		
15053-1	(0.7)	0.0	-2.4	-2.4	-2.42	3.92	0.263		
15053-1	(0.7)	0.0	-2.4	-2.4	-2.42	3.92	0.419		
15054-1	(0.7)	-2.4	0.0	-2.4	0.90	6.77	0.123		
15054-1	(0.7)	-2.4	0.0	-2.4	0.90	6.77	0.351		
15055-1	(0.7)	2.4	0.0	-2.4	-5.74	1.07	0.632		
15055-1	(0.7)	2.4	0.0	-2.4	-5.74	1.07	0.453		
15056-1	(0.7)	0.0	0.0	-3.4	-3.42	5.53	0.152	0.315	0.630
15056-1	(0.7)	0.0	0.0	-3.4	-3.42	5.53	0.107	0.350	0.875
								Mean value	0.954

a Values in parentheses are selected values

Figure 27

VARIATION OF $C_p^o/\Delta m$ WITH r FOR CONTAMINATION OF LAUREL TREE

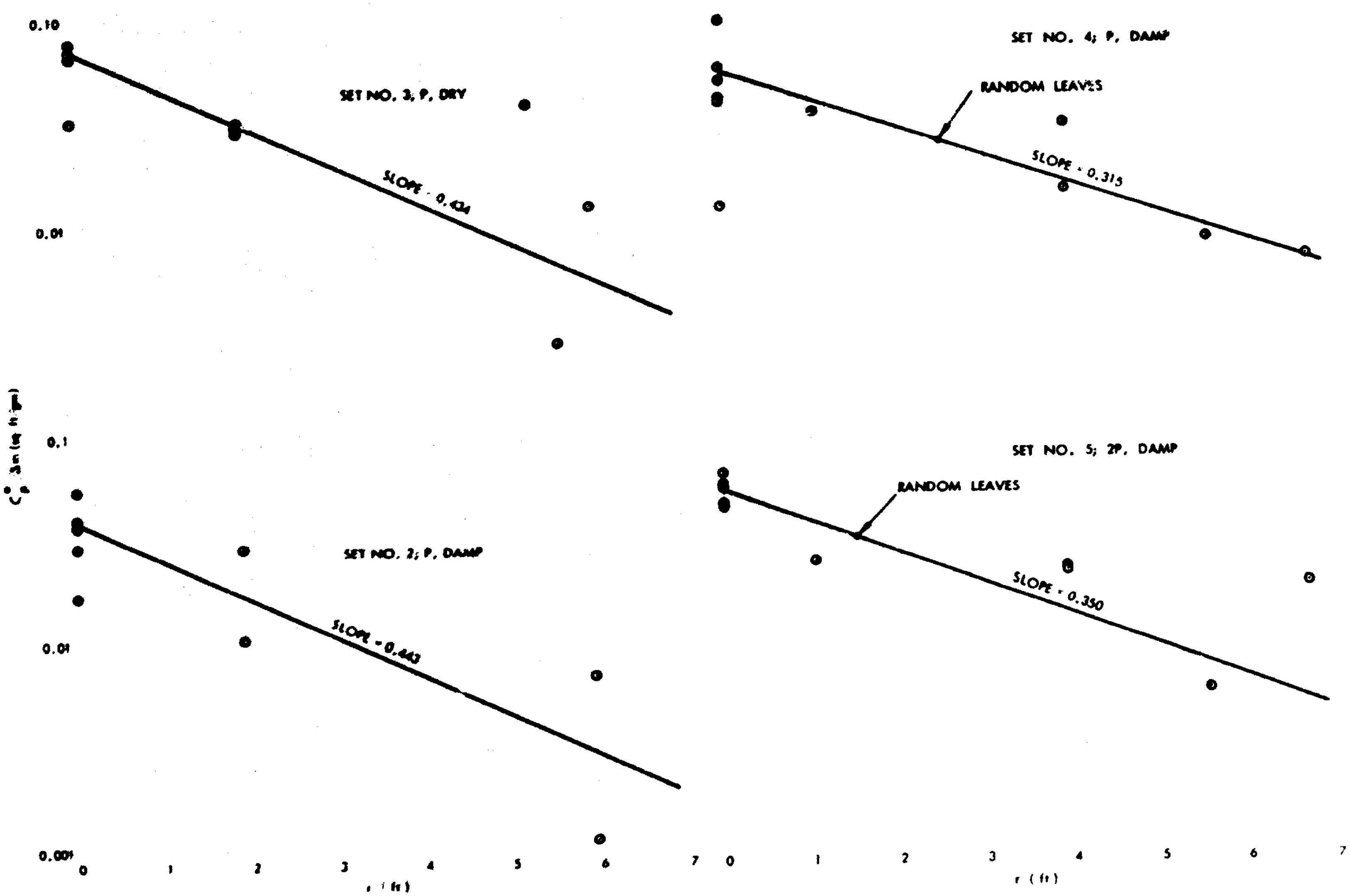


Figure 28

VARIATION OF $C_p^o/\Delta m$ WITH r FOR CONTAMINATION OF PINE-2

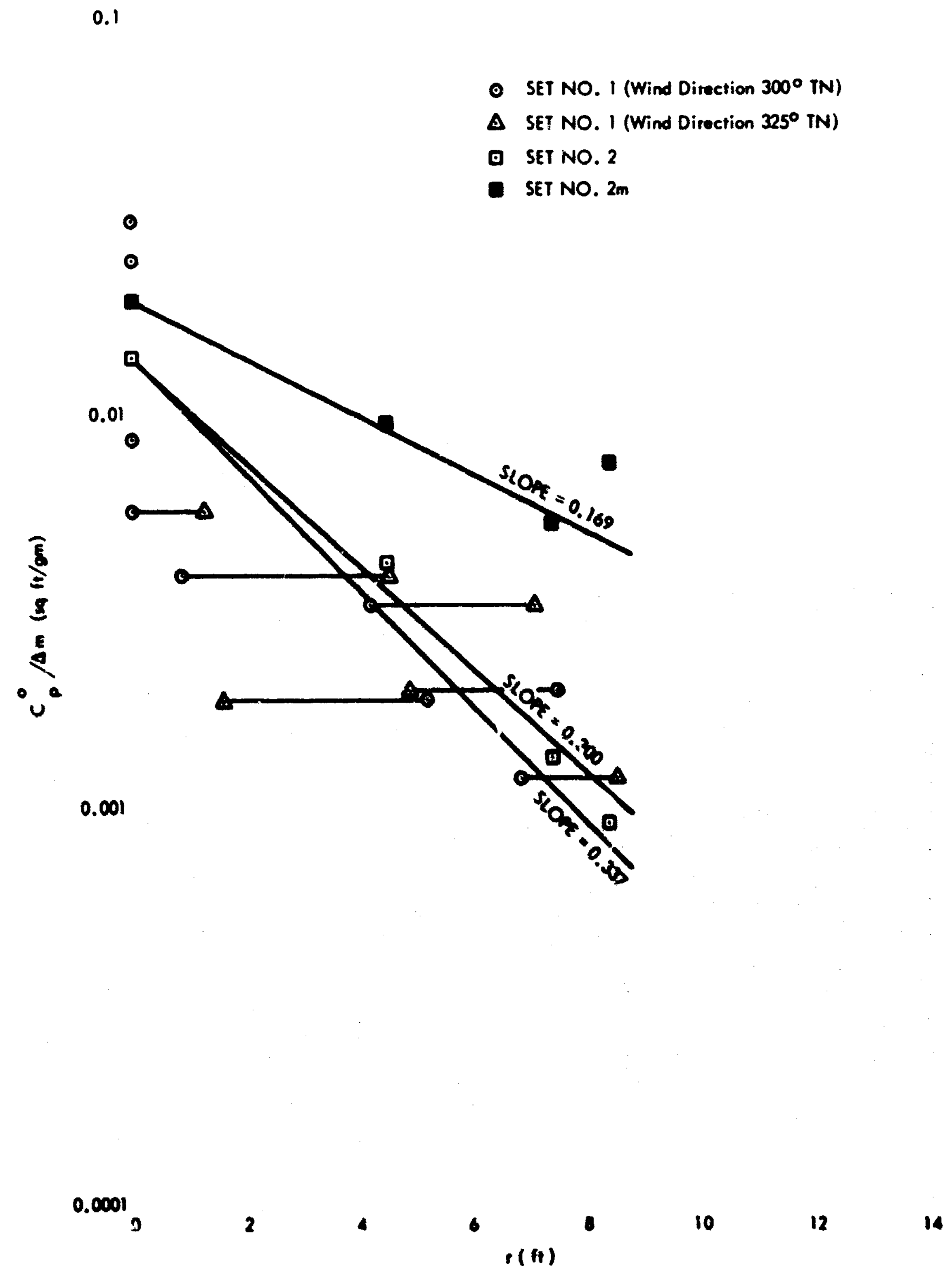


Table 26

SUMMARY OF ESTIMATED VALUES OF $\overline{\Delta m}(eff)/\Delta m$ AND η FOR THE CANOPIES OF SEVERAL TREES

Sample Number	$\bar{v}_w$ (mi/hr)	$W_L/\pi a^2$ (gm/sq ft)	sin φ	a_L (sq ft/gm)	$\overline{\Delta m}(eff)/\Delta m$	η	η / $\overline{\Delta m}(eff)/\Delta m$	Mean
				1. Avocado				
14524-1	3.9	135	0.3494	0.0212	0.833	0.833	1.00	
14546-1	3.7	135	0.4618	0.0221	0.846	1.16	1.37	
14570-1	3.9	135	0.4376	0.0169	0.833	0.832	0.999	
14624-1	10.1	135	0.3583	0.0207	0.535	0.535	1.00	
14641-1	7.5	135	0.2286	0.0294	0.636	0.577	0.907	1.00
				2. Camphor[a]				
Set No. 1	3.0	54.5	(0.5548)[b]	0.0498	0.642	0.966	1.50	
Set No. 2	3.0	54.5	0.3977	0.0374	0.642	0.520	0.810	
Set No. 3	3.0	54.5	1.3977	0.0430	0.642	0.584	0.910	
Set No. 4	3.8	54.5	0.2122	0.[illegible]23	0.563	0.800	1.42	
Set No. 5	3.1	54.5	0.4279	0.0401	0.631	0.590	0.935	
Set No. 6	4.6	54.5	(0.4472)	0.0232	0.499	0.282	0.565	
Set No. 7	4.0	54.5	(0.4472)	0.0345	0.544	0.457	0.840	
Set No. 8	3.3	54.5	(0.4318)	0.0151	0.609	0.216	0.355	
Set No. 9	2.8	54.5	0.4318	0.0188	0.665	0.293	0.442	0.782
				3. Grapefruit				
All Samples	3.0	46.2	0.2773	0.0171[c]	-	0.221	-	
16066s-1	3.0	46.2	0.2773	0.0288	0.614	0.227	0.370	0.370

Table 26 (concluded)

Sample Number	$\bar{v}_w$ (mi/hr)	$W_L/\pi a^2$ (gm/sq ft)	$\sin \varphi$	a_L (sq ft/gm)	$\overline{\Delta m}(eff)/\Delta m$	η	$\frac{\eta}{\overline{\Delta m}(eff)/\Delta m}$	Mean
				4. Laurel[a]				
Set No. 2	2.0	71.2	(0.8083)	0.0384	0.844	1.86	2.21	
Set No. 3	3.9	71.2	0.8083	0.0567	0.644	2.10	3.26	
Set No. 4	2.0	71.2	(0.8083)	0.0804	0.844	3.90	4.63	
Set No. 5	2.5	71.2	(0.8083)	0.0560	0.795	2.56	3.22	3.31
				5. Pine-2[a,d]				
Set No. 1	2.0	87.0	0.4321	0.0130	0.730	0.401	0.549	
Set No. 2	3.0	86.7	0.2773	0.0145	0.591	0.239	0.405	0.472

a a_L are mean values for each set of samples, including correction by factor of $e^{\beta r}$ as applicable

b Values in parentheses correspond to the assumed α values

c Random sample value

d Assumed shape was that of a half-ellipse; projected area varies with α

Table 27

SUMMARY OF GEOMETRIC COEFFICIENTS
FOR PERSONNEL CONTAMINATION FUNCTIONS

Part of Body or Apparel	Designation of η	Geometric Coefficients (sq ft)		
		WBL	CFM	JLJ
Hair	$\eta(h)$	0.14	0.17	0.15
Ear	$\eta(e)$	0.045	0.038	-
Face	$\eta(f)$	0.40	0.44	-
Forehead	$\eta(f)$	-	0.12	-
Forearms	$\eta(fa)$	-	0.21	-
Forearms and hands	$\eta(fa)$	-	0.34	-
Spectacles	$\eta(s)$	-	0.039	-
Blouse or shirt	$\eta(b)$	1.75	2.00	1.25

Table 28

DERIVED VALUES OF η
FOR PERSONNEL CONTAMINATION FUNCTIONS

Sample Numbers	φ	τ (mi)	η Values WBL	CFM	JLJ	η Designation
PC-1,2	$12^\circ 42'$	25.2	0.299	0.133		η(h)
PC-3,4			0.036	0.037		η(e)
PC-5				0.00831		η(s)
PC-6,7	$21^\circ 29'$	15.6	0.138	0.0798		η(h)
PC-8				0.0254		η(f)
PC-9				0.0112		η(s)
PC-10	$22^\circ 10'$	30.1		0.130		η(h)
PC-11				0.00245		η(f)
PC-12	$12^\circ 07'$	49.0		0.145		η(fa)
PC-13	-	-	-	-		-
PC-14	$23^\circ 07'$	18.0	0.534			η(h)
PC-15,16	$23^\circ 07'$	22.5		0.252	0.194	η(h)
PC-17				0.0198		η(f)
PC-18				0.0734		η(e)
PC-19				0.0900		η(fa)
PC-20				0.0539		η(s)
PC-21	$23^\circ 07'$	13.4		0.141		η(b)
PC-22,23	$22^\circ 42'$	4.2	0.892	1.08		η(h)
PC-24				0.230		η(fa)
PC-25,26	$53^\circ 56'$	0.98	2.002	1.096		η(h)

Figure 29

VARIATION OF η_h WITH τ

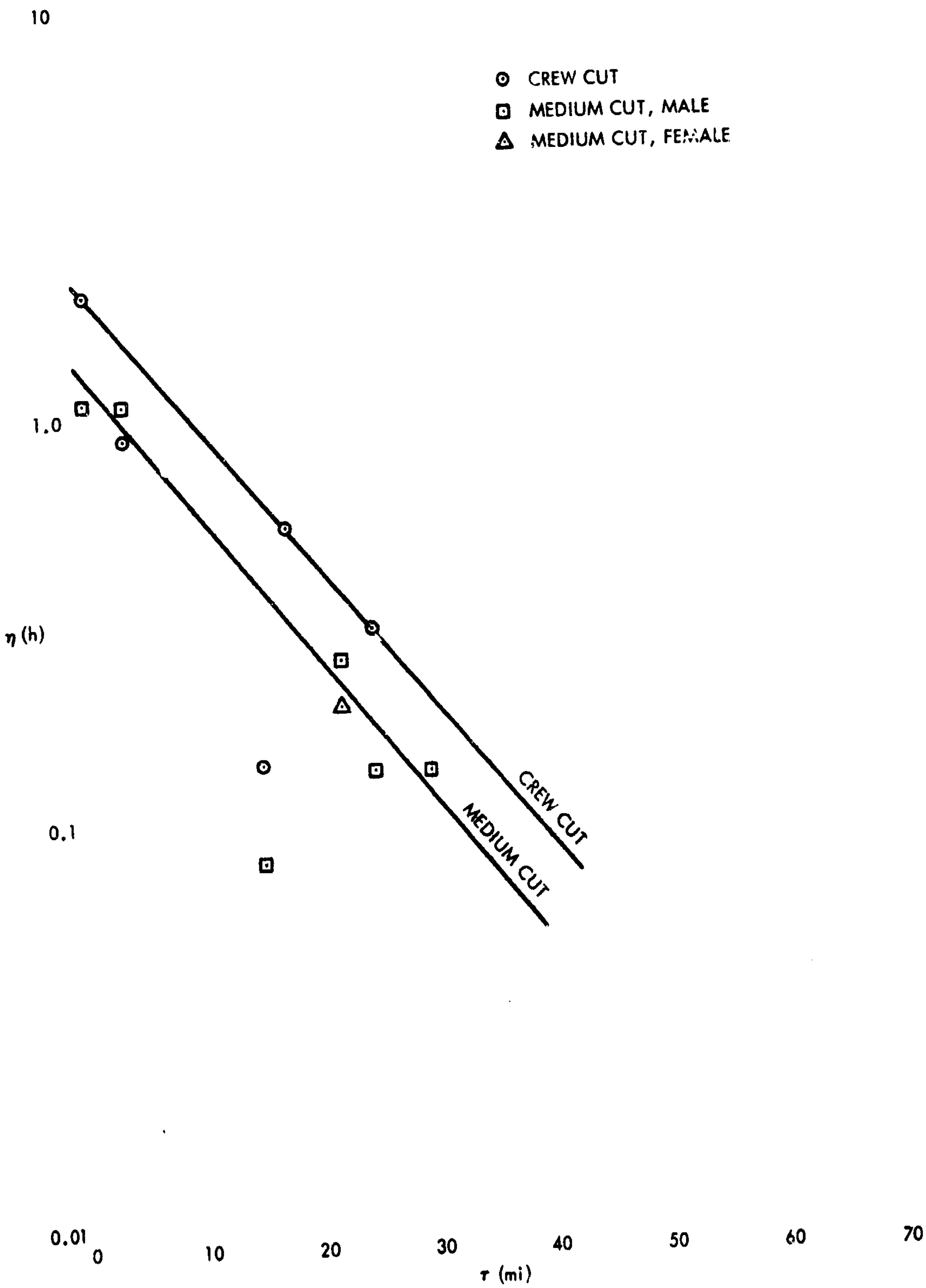
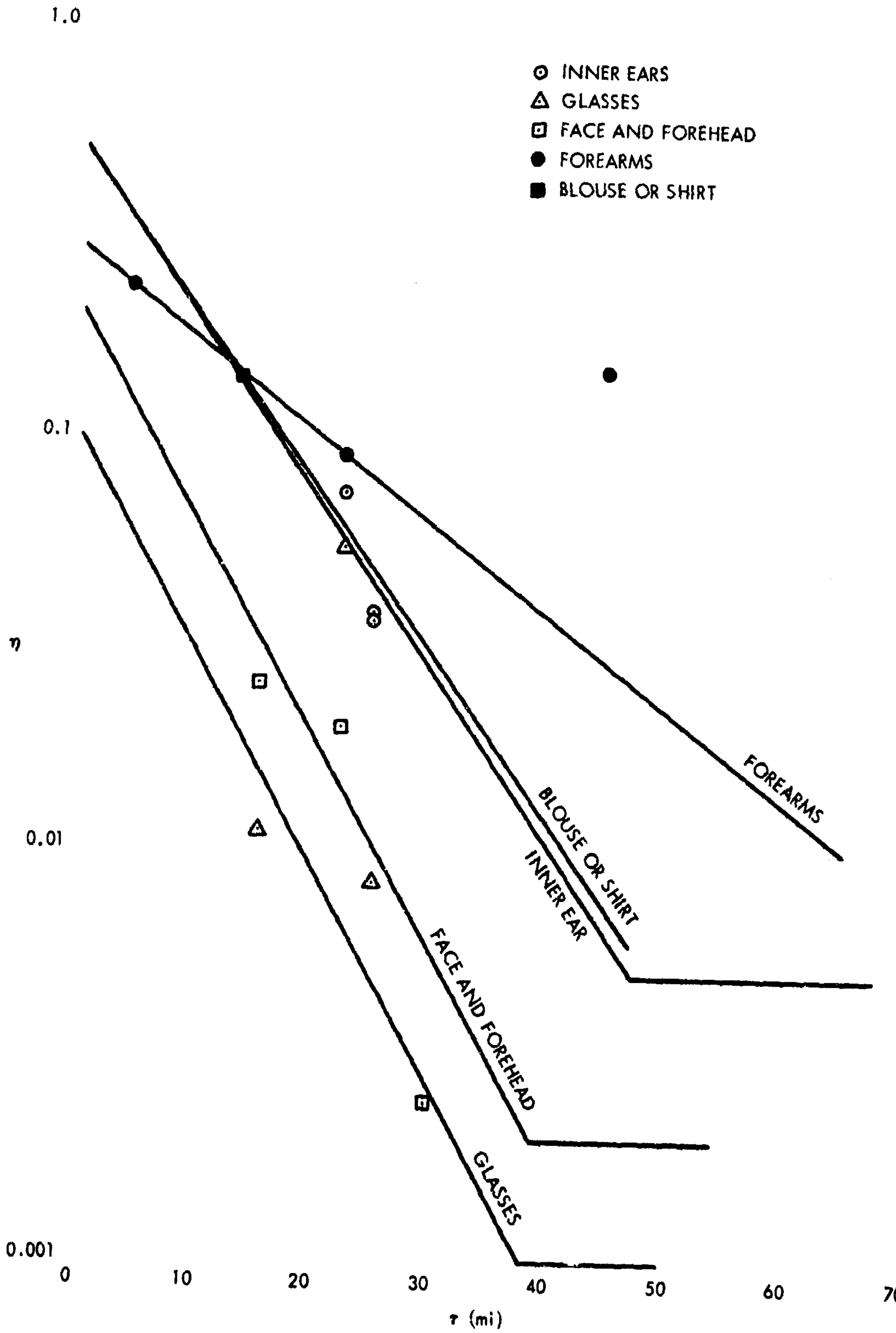


Figure 30

VARIATION OF η WITH τ FOR CONTAMINATION OF EARS, GLASSES, FACE, FOREARMS, AND BLOUSE OR SHIRT



SUMMARY AND CONCLUSIONS

The derivation and evaluation of parametric scaling functions representing the retention of airborne particles by the foliage of various types of plants is presented in this part (Part Three) of the report on Operation Ceniza-Arena. The scaling functions include, as independent variables, wind speed, particle fall angle, planting density, plant weight, time after contamination, rainfall, and plant shape factors. The output parameters include the fraction of the horizontal component of the particle flux initially retained by the foliage, the relative amount of the retained particles removed by wind-weathering, the relative amount of the retained particles removed by rain, and the rate of growth of plants (i.e., rate of accumulation of dry matter) with time after planting. Some data on the frequency distributions of plant weights and leaf areas and on the correlation between leaf area (or area of other plant parts) and the dry weight are presented. In addition, approximating functions are presented for estimating the degree of particle retention by single trees and humans. The numerical evaluation of all the scaling functions was carried out using only the data obtained from the measurements made in Operation Ceniza-Arena during the period from March 1964 through February 1965.

STANFORD RESEARCH INSTITUTE

Main Offices and Laboratories

333 Ravenswood Avenue
Menlo Park, California 94025
(415) 326-6200
Cable: STANRES, Menlo Park
TWX: 910-373-1246

Regional Offices and Laboratories

Southern California Laboratories
820 Mission Street
South Pasadena, California 91030
(213) 799-9501 • 682-3901
TWX: 910-588-3280

SRI-Washington
1611 North Kent Street, Rosslyn Plaza
Arlington, Virginia 22209
(703) 524-2053
Cable: STANRES, Washington, D.C.
TWX: 710-955-1137

SRI-New York
200 E. 42nd Street
New York, New York 10017
(212) 661-5313

SRI-Huntsville
Missile Defense Analysis Office
4810 Bradford Blvd., N.W.
Huntsville, Alabama 35805
(205) 837-3050
TWX: 810-726-2112

SRI-Chicago
10 South Riverside Plaza
Chicago, Illinois 60606
(312) 236-6750

SRI-Europe
Pelikanstrasse 37
8001, Zurich, Switzerland
27 73 27 or 27 81 21
Cable: STANRES, Zurich

SRI-Scandinavia
Skeppargatan 26
S-114 52 Stockholm, Sweden
60 02 26; 60 03 96; 60 04 75

SRI-Japan
Edobashi Building, 8th Floor
1-6, Nihonbashi Edobashi
Chuo-ku, Tokyo
Tokyo 271-7108
Cable: STANRESEARCH, Tokyo

SRI-Southeast Asia
Bangkok Bank Building
182 Sukhumvit Road
Bangkok, Thailand
Bangkok 910-181
Cable: STANRES, Bangkok

Representatives

France
Roger Godino
94, Boulevard du Montparnasse
75 Paris 14ᵉ, France
633 37 30

Italy
Lorenzo L. Franceschini
Via Macedonio Melloni 49
20129, Milan, Italy
72 32 46

Portugal
J. Gasparinho Correia
Avenida Joao XXI, 22-3 Esq.
Lisbon, Portugal
72 64 87

April 1968

TITLE: Operation Ceniza-Arena: The Retention of Fallout Particles from Volcán Irazú (Costa Rica) by Plants and People, Part Three

Prepared by: Carl F. Miller

SUMMARY:

The derivation and evaluation of parametric scaling functions representing the retention of airborne particles by the foliage of various types of plants is presented in this part (Part Three) of the report on Operation Ceniza-Arena. The scaling functions include, as independent variables, wind speed, particle fall angle, planting density, plant weight, time after contamination, rainfall, and plant shape factors. The output parameters include the fraction of the horizontal component of the particle flux initially retained by the foliage, the relative amount of the retained particles removed by wind-weathering, the relative amount of the retained particles removed by rain, and the rate of growth of plants (i.e., rate of accumulation of dry matter) with time after planting. Some data on the frequency distributions of plant weights and leaf areas and on the correlation between leaf area (or area of other plant parts) and the dry weight are presented. In addition, approximating functions are presented for estimating the degree of particle retention by single trees and humans. The numerical evaluation of all the scaling functions was carried out using only the data obtained from the measurements made in Operation Ceniza-Arena during the period from March 1964 through February 1965.

SRI Project No. MU-4890 December 1967

Contract No. OCD-PS-64-127
OCD Work Unit No. 3118A

TITLE: Operation Ceniza-Arena: The Retention of Fallout Particles from Volcán Irazú (Costa Rica) by Plants and People, Part Three

Prepared by: Carl F. Miller

SUMMARY:

The derivation and evaluation of parametric scaling functions representing the retention of airborne particles by the foliage of various types of plants is presented in this part (Part Three) of the report on Operation Ceniza-Arena. The scaling functions include, as independent variables, wind speed, particle fall angle, planting density, plant weight, time after contamination, rainfall, and plant shape factors. The output parameters include the fraction of the horizontal component of the particle flux initially retained by the foliage, the relative amount of the retained particles removed by wind-weathering, the relative amount of the retained particles removed by rain, and the rate of growth of plants (i.e., rate of accumulation of dry matter) with time after planting. Some data on the frequency distributions of plant weights and leaf areas and on the correlation between leaf area (or area of other plant parts) and the dry weight are presented. In addition, approximating functions are presented for estimating the degree of particle retention by single trees and humans. The numerical evaluation of all the scaling functions was carried out using only the data obtained from the measurements made in Operation Ceniza-Arena during the period from March 1964 through February 1965

SRI Project No. MU-4890 December 1967

Contract No. OCD-PS-64-127
OCD Work Unit No. 3118A

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R & D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) STANFORD RESEARCH INSTITUTE Menlo Park, California 94025	2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b. GROUP

3. REPORT TITLE

OPERATION CENIZA-ARENA: THE RETENTION OF FALLOUT PARTICLES FROM VOLCAN IRAZU (COSTA RICA) BY PLANTS AND PEOPLE, PART THREE

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

5. AUTHOR(S) (First name, middle initial, last name)

Carl F. Miller

6. REPORT DATE	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS
December 1967	255	1

8a. CONTRACT OR GRANT NO. OCD-PS-64-127 b. PROJECT NO. OCD Work Unit No. 3118A c. SRI Project No. MU-4890 d.	9a. ORIGINATOR'S REPORT NUMBER(S) 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report)

10. DISTRIBUTION STATEMENT

Distribution of this document is unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY Office of Civil Defense Department of the Army Washington, D.C. 20310

13. ABSTRACT

The derivation and evaluation of parametric scaling functions representing the retention of airborne particles by the foliage of various types of plants is presented in this part (Part Three) of the report on Operation Ceniza-Arena. The scaling functions include, as independent variables, wind speed, particle fall angle, planting density, plant weight, time after contamination, rainfall, and plant shape factors. The output parameters include the fraction of the horizontal component of the particle flux initially retained by the foliage, the relative amount of the retained particles removed by wind-weathering, the relative amount of the retained particles removed by rain, and the rate of growth of plants (i.e., rate of accumulation of dry matter) with time after planting. Some data on the frequency distributions of plant weights and leaf areas and on the correlation between leaf area (or area of other plant parts) and the dry weight are presented. In addition, approximating functions are presented for estimating the degree of particle retention by single trees and humans. The numerical evaluation of all the scaling functions was carried out using only the data obtained from the measurements made in Operation Ceniza-Arena during the period from March 1964 through February 1965.

DD FORM 1 NOV 65 1473 (PAGE 1)

S/N 0101-807-6801

UNCLASSIFIED
Security Classification

14 KEY WORDS	LINK A		LINK B		LINK C	
	ROLE	WT	ROLE	WT	ROLE	WT
Volcano						
Volcán Irazú						
Volcanic debris						
Volcanic eruptions						
Fallout						
Foliar Contamination						
Plant Contamination						
Particles						
Weathering						
Redistribution						
Meteorology						
Contamination Factors						